

THE IRON AGE

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Foundry for Marine Engine Castings

New Plant of American Shipbuilding Company Designed for a Wide Range from Small Work to Large Loam Molds

A foundry for producing gray iron castings in a wide range of sizes from $\frac{1}{2}$ lb. to an engine bed plate weighing over 16 tons in green and dry sand and loam molds has been built by the American Shipbuilding Company adjoining its shipyard in Cleveland, Ohio. It takes the place of two other foundries that were operated by the company at different points. The entire product of castings is used in building marine engines and auxiliaries.

height. Continuous Fenestra steel sash and ribbed glass are provided in the upper part of the side walls and in the monitor, affording an abundance of light, as well as ventilation, through the swinging window section.

The main foundry bay is used for large floor work in green and dry sand and loam molding, and the east bay for bench work and light floor molding. As the foundry is located on low ground, steel tanks



Nearly Completed Loam Mold for an Intermediate Cylinder for a Marine Engine

The plant is arranged for the convenient handling of metal, molds and castings, and because of the large castings made, is provided with much greater crane capacity than would be required in a plant making only light castings.

The foundry building is 120 x 280 ft., and is divided by a brick partition into a foundry 120 x 180 ft. and a machine shop 120 x 100 ft. The building is of brick and steel construction, and is divided into three 40-ft. bays with a monitor section over the center bay. The height of the building is 46 ft. to the peak of the monitor, 27 ft. 6 in. at the eaves of the side bays and 31 ft. at the junction of the side bay roofs with the monitor. There are two crane runways, one in the center bay 30 ft. above the floor and the other in the east bay 18 ft. in

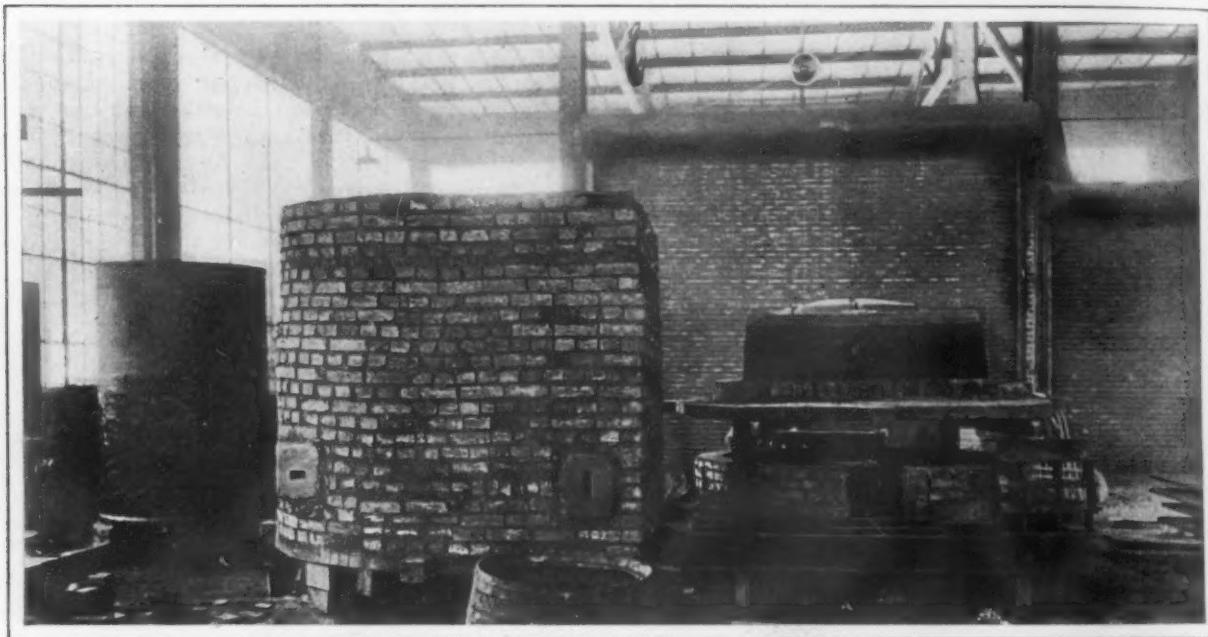
are set in the floor of the center bay to provide against drain water in the molds. There are two circular tanks 10 ft. deep, one 18 ft. in diameter and the other 10 ft. in diameter, for loam work, and a rectangular tank 20 ft. wide, 40 ft. long and 5 ft. deep for large green sand molds. These tanks are covered inside and out with a non-corrosive paint. The center bay is served by a 30-ton electric traveling crane with a 5-ton auxiliary built by the company. This crane is used for handling molten metal, copies and castings. A second 30-ton Pawling & Harnischfeger crane is shortly to be installed. In addition the casting pits in the center bay are served by two 5-ton jib cranes operated with air motors. Large molds are poured from a 5-ton and a 10-ton ladle handling both by the traveling and

jib cranes, and the installation of another 30-ton crane will be made to provide an abundance of handling capacity when large molds are being poured. The large floor work in green and dry sand includes molds for bed plates, driving blocks, columns, pistons and steam chest covers. Bed-plate molds and some of the other large molds are skin dried. Loam molds are made for such parts as cylinders, air pumps and condensers for fresh water boats.

The greater part of the smaller molds made in the east bay are hand made, although two Herman pneumatic molding machines are used in this section of the foundry, one a 60 x 72-in. plain jolt machine and the other a jar-ram squeezer. This bay is served by two 7-ton cranes. Ladles of metal are placed by the center bay crane on a short transverse transfer track, on which they are run to the side bay to be picked up by the cranes in that bay. The larger molds in this bay are poured by means

from one point. Coke is used for fuel. Small cores are made on an Osborn core machine.

The melting equipment consists of two Whiting cupolas, one 66 in. in diameter lined down to 48 in. and one 84 in. in diameter lined down to 66 in. Were the product only light castings, one cupola would be sufficient, but a cupola of a large size is required when large bed plates and cylinder molds are being poured. The smaller one is sufficient when medium size and small castings are being made. Consequently, one or the other of the cupolas is used, depending on the class of work that is being done. The average melt is 25 to 30 tons a day. The cupolas are hand charged from two sides. The charging floor is of steel construction, and has sufficient storage capacity for a week's supply of pig iron and coke. The air blast for the two cupolas is furnished by two Buffalo Forge Company blowers, one with a 14-in. and the other with a 16-in. outlet, and each direct connected to a 50-hp. Reliance



Mold for a Low-Pressure Cylinder with Body Core at Left and Top and Bottom Sections on Truck at Right

of one of the cranes and the smaller ones from hand ladles.

The west bay is taken up with cupolas located in the center, and the core room, core ovens, cleaning department, sand-mixing equipment and brass foundry. There are two large ovens, one 14 ft. wide, 21 ft. deep and 12 ft. high for large cores, and one 18 ft. wide, 24 ft. deep and 14 ft. high for drying loam molds. Large cores and loam molds are run into these ovens on trucks. For drying small cores and for light work on the larger cores a Coleman drawer type oven is provided. This is 6 ft. long, 3 ft. wide and with five drawers, two 8 in., one 10 in., and two 14 in. high. The larger ovens are placed side by side, and the smaller oven at right angles to the other two and against the back of the large core oven. The position of the ovens permits a convenient arrangement for firing the three ovens from one pit. The mold-drying oven, being 3 ft. longer than the adjoining core oven, extends 3 ft. further back and the fire box of this oven is on the side of this extended portion bringing this fire box and that of the drawer oven on opposite sides of the pit, and the fire box at the back of the large core oven on the side of the pit between the other two fire boxes, all in convenient reach for firing

motor. Either blower may be used for each cupola. The blowers are located close to the cupolas under the charging floor so that long blast pipes are not required. The charging floor has a 5-ton Otis hydraulic elevator for handling pig iron and coke in an emergency.

Adjoining the charging floor is a steel platform 14 x 40 ft. wide and 14 ft. high, on which the pig iron and coke is loaded, either direct from the cars or from the adjoining storage yard, with an Industrial Works locomotive crane, a magnet being used in handling the pig iron. At the side of the building adjoining the platform and opening into the west bay are four sand bins built of concrete, 10 ft. wide, 18 ft. deep and 12 ft. high. Openings are provided in the top of these bins through which the sand is discharged, being unloaded directly from the cars with the locomotive crane. Two other concrete bins are provided under the charging platform for clay and charcoal. A motor-driven No. 3 Standard sand-batch mixing machine, with elevator equipment, is located in the west bay near the sand bins. Sand on the foundry floor is shaken out with two Combs gyrating riddles.

The cleaning department at the opposite end of this bay is equipped with a 30 x 60-in. and 30 x 84-

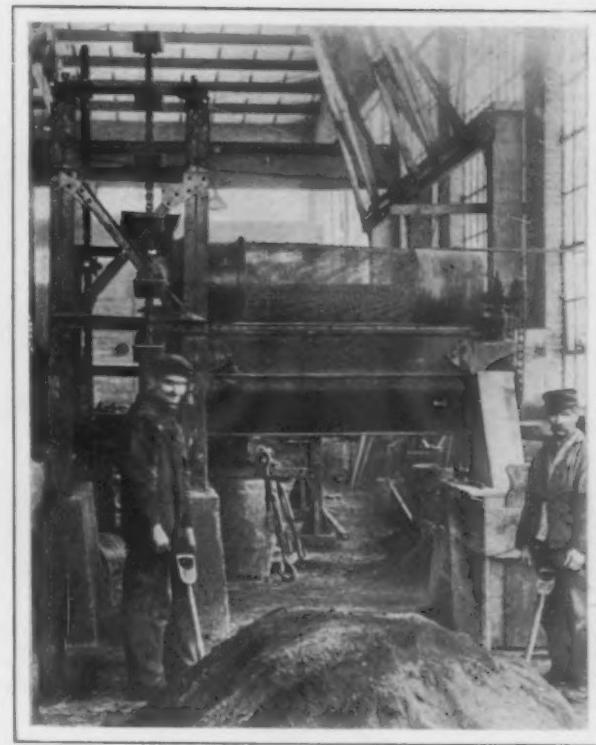
in. Sly tumbling mill, connected to a Sly dust arrester located directly under the bay roof, and two emery wheels connect to the dust arrester. The cleaning equipment is belt driven from the line shaft connected to a motor located under the bay roof. Air for the molding machines, chipping hammers and jib cranes is supplied from the company's shipyard, and is kept in a storage tank 14 ft. high and 48 in. in diameter, located outside the foundry. Adjoining the cleaning department is the brass foundry, occupying a wire screen enclosed space 20 x 40 ft. Here such brass parts as engine bearings, flanges, valves and air ports are cast.

At the north end of the foundry are two industrial tracks, one extending out the side of the building and the other into the machine shop at this end of the building. The brick partition between the foundry and machine shop keeps the dust and smoke of the former from entering the latter. In addition to a small door for workmen the two departments are connected by a Kinnear steel door 10 ft. high and 14 ft. wide, which covers the opening provided for the industrial track. Finished castings are placed on a large truck to be taken to the machine shop or on another truck to go outside for shipment to the machine shop at the Lorain yards. The machine shop is designed for building machinery for vessels, such as steering, mooring, windlass and hatch engines, and for repair work. This has a concrete floor. It is equipped with a 30-ton Pawling & Harnischfeger crane in the center bay and a 7-ton crane in the west bay. All of the large machines are motor driven, a 100-kw. and a 30-kw. direct-current motor generator set being provided for furnishing power for the machine tools and cranes. At the end of the east foundry bay, adjoining the machine shop, is a well-equipped toilet room for both departments.

The pattern shop and pattern storage building is located a short distance from the foundry, from which it is separated by the storage yard. This is a two-story fireproof building of brick and concrete construction with concrete floors. The lower floor is 14 ft. high and the upper floor has a 12-ft. ceiling. The pattern shop is located at one end of the lower floor, the remainder of this floor being used for the most part for storage of large patterns on the floor. Small patterns are stored on wooden shelves on the floor above, the shelf space extending nearly to the ceiling. A wide center aisle about 8 ft. high runs the length of the room.

The usual foundry practices are for the most part followed in making loam molds for large marine engine castings. The outside of the molds are made with a pattern and the inside is swept up. The large cylindrical body cores are made by the sweep process. All cores are made of dry sand. One of the illustrations shows a loam mold for an intermediate cylinder for a Norwegian boat. The size of this mold is indicated by the fact that it is 5 ft. 2 in. wide on face, 3 ft. 7 in. wide on the opposite side; 4 ft. 9½ in. thick inside the mold, and 5 ft. 8 in. deep. The complete casting weighs about 6 tons. The hole shown on the brick back of the mold on one side is for convenience in setting the port exhaust cores that are wired on the opposite side of the mold. This is filled in when the mold is completed. Two large cores are required for this mold. The body core is 2 ft. 9 in. in diameter, and the steam chest core 4 ft. 4 in. wide, 4 ft. 8 in. high and 19 in. thick at its thickest point.

In another illustration is shown in the foreground a mold for a low-pressure cylinder for the same type of engine. At the left in the same illustration is a body core for this cylinder, this cylind-



Standard Sand Batch Mixing Machine with Elevating Attachment

rical core being 54 in. in diameter. This cylinder mold is 5 ft. 2 in. across its face and 5 ft. 8 in. high. Engine cylinder molds are made in three parts. On the truck at the left ready to go into the drying oven appears the bottom part of the mold and beneath it is the top part of the mold, which is split in two sections. The holes shown near the bottom of the main section of this mold are provided for the escape of gas.

Rail Exports and Imports in 1915

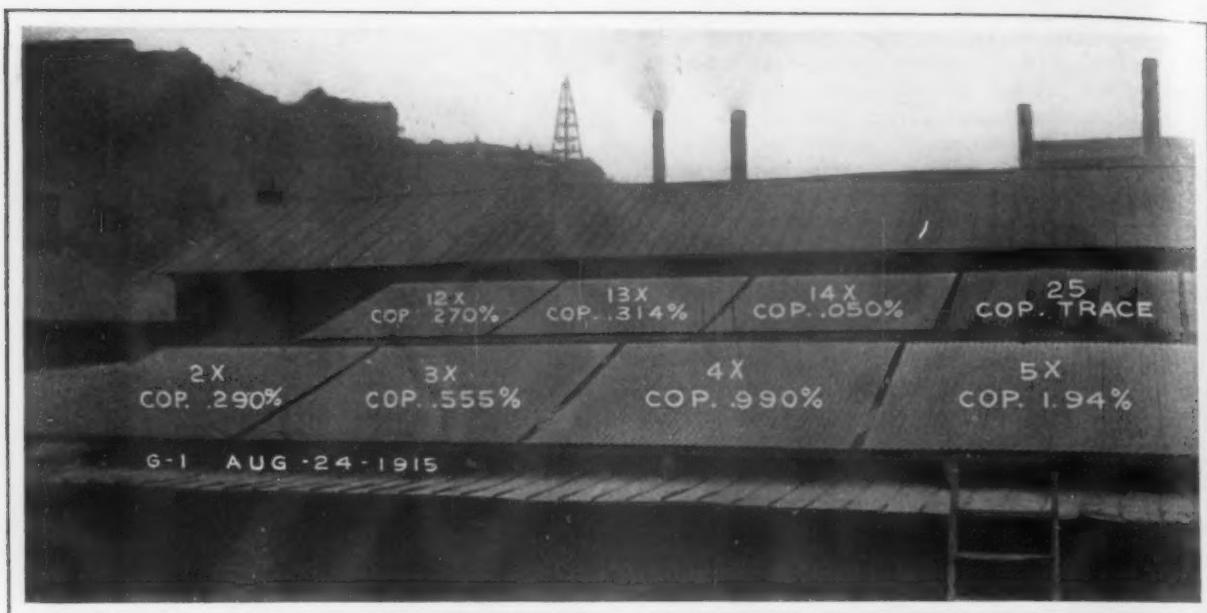
Rail exports from the United States for 1915 were 391,491 gross tons against 460,553 tons in 1913, and only 174,680 tons in 1914. The contrast in the destination of the exports last year and those of 1913 is shown by the following table:

	1913. Gross Tons	1915 Gross Tons
Canada	161,971	7,608
Central American States and British Honduras	12,418	6,696
Mexico	13,907	2,653
West Indies and Bermuda	32,954	36,529
Argentina	41,181	8,374
Brazil	41,215	3,573
Other South America	33,525	22,065
Japan	20,820	3,543
Other Asia and Oceania	90,405	176,232
Other countries	12,157	124,218
Total	460,553	391,491

The decided falling off in exports to Canada, Mexico, Japan and South American countries will be noted, as well as the increase to "Other Asia and Oceania," "Other countries" and to the West Indies and Bermuda.

Imports of rails in 1915 were 78,525 gross tons, or the largest recorded. These compare with 22,571 tons imported in 1914 and 10,408 tons in 1913. The value of the 1915 imports is given as \$2,088,532 or \$26.59 per ton. The receipts in November and December were 3305 tons and 1280 tons, respectively, contrasting with 13,294 tons in October, indicating the filling early in the fall of the contracts taken in this country by the Algoma mill.

At a meeting of the directors of the Redding Steel Valve Company, Cleveland, Ohio, it was decided to change the name of the company back to that under which it was organized, namely, the Cleveland Steel Valve Company.



New Research in Corrosion Resistance*

The Amount of Copper Addition to Steel That Is Most Effective—Influence of Other Elements and of Cold Steel

BY D. M. BUCK AND J. O. HANDY

In addition to repeating work already done on the effect of the addition to steel of approximately 0.25 per cent copper we have included in this test steels with a copper content as low as 0.04 per cent, as well as steels with higher amounts up to and including 2 per cent. We also made additions of phosphorus, silicon, aluminum, sulphur, roll scale, and, following a suggestion by a colleague that the addition of cold steel to the middle ingots of the heat would cause them to outlast the first poured ingots, a similar amount of cold

steel turnings was added to one of the ingots in exactly the same manner in which the copper had been added to the others.

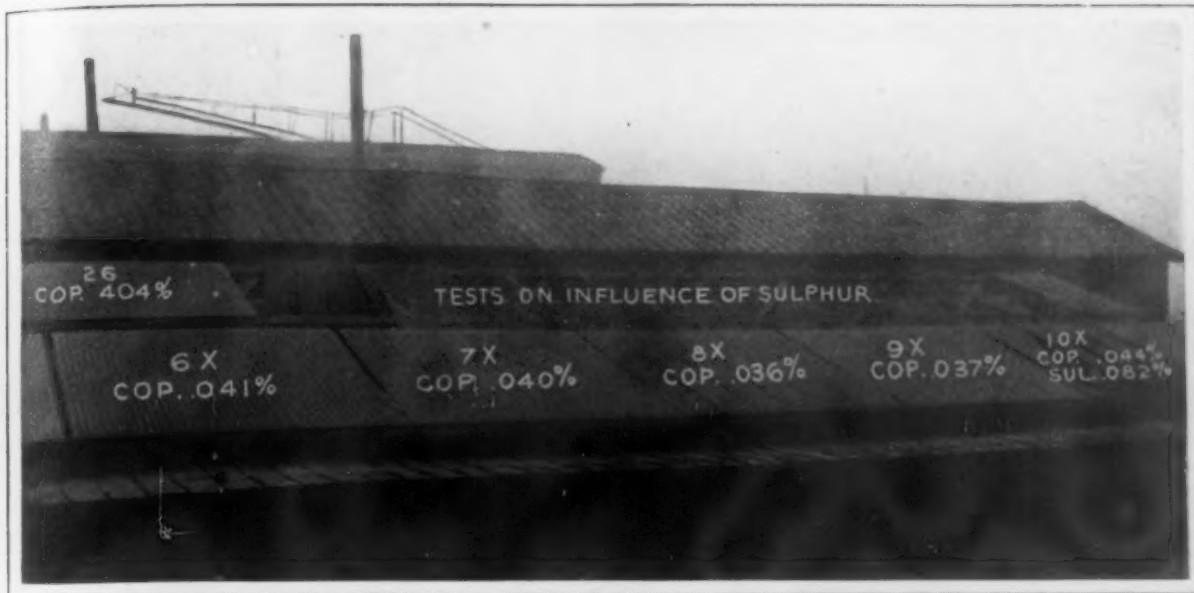
Some work has also been done on the influence of annealing temperatures higher than the average practice, and we have kept careful records of inside and outside sheets of the pack, and of the presence or absence of mill scale on the surface of the sheets at the time of exposure, to determine whether or not these differences in initial protection affected the ultimate time of failure of the sheets.

CHARACTER OF THE HEATS USED

Several heats of open-hearth and Bessemer steel were used in the tests. In one instance ten ingots were used from a single heat, and they differed one from the other only in the amount and kind of element which was added. These are represented by grades 2 to 11 in Table 1. In another heat approximately one-half was run into a ladle and copper added, aiming at 0.25 per cent. The remainder of the heat was run into another ladle without copper addition; while casting, copper was added to one ingot. This heat is represented by grades 12, 13 and 14 in Table 1. A high sulphur Bessemer heat, the sulphur being residual and not added, is represented by grades 15 and 16. Grades 17 and 18, in Table 1 are from a normal Bessemer heat. In the manufacture of the heat represented by grades 19 to 24, an effort was made to produce a wild, oxidized heat. The steel was melted "hot"; ore was fed faster than usual and continued, even after carbon had been reduced to 0.12 per cent. Silica sand was added instead of dolomite. The heat had a very wild appearance, rose strongly in the molds, and in addition, we had a running stopper in the ladle which

TABLE I—SHOWING LOSS IN OUNCES PER SQUARE FOOT PER MONTH FOR EACH PERIOD OF EXPOSURE IN BOTH TESTS AT SCOTTDALE AND MC KEESPORT, PENNSYLVANIA

Grade	Carb.	Mang.	Sil.	Phos.	Silicon	Copper	Annual-			SCOTTDALE			McKEESPORT						Element Added	
							Temp.	6.5 Months	8.5 Months	10.5 Months	Grand Average	8.5 Months	10.5 Months	Grand Average	Rank					
2	.06	.41	.039	.032	.004	.272	1400	.1411	.1361	.1386	.1134	.1057	.1095	.1241	9	Copper				
3	.06	.43	.045	.041	.004	.549	1600	.1405	.1382	.1393	.1041	.1045	.1043	.1218		Copper				
4	.07	.43	.039	.036	.004	1.085	1400	.1423	.1345	.1384	.1089	.1047	.1068	.1226	8	Copper				
5	.06	.42	.042	.040	.004	2.180	1600	.1374	.1338	.1356	.1043	.0961	.1062	.1179		Copper				
6	.06	.45	.047	.035	.004	.018	1400	.1372	.4202	.3962	.1843	.2215	.2029	.2996	19	Copper				
7	.06	.44	.047	.089	.009	.016	1600	.2632	.3831	.5231	.1634	.2007	.1820	.2526		None				
8	.06	.41	.045	.054	.319	.016	1400	.3040	.3564	.3302	.1589	.1682	.1635	.2469	16	Phosphorus				
9	.06	.43	.047	.036	.007	.017	1600	.2692	.3258	.2975	.1460	.1620	.1540	.2257		Phosphorus				
10	.06	.43	.075	.028	.008	.019	1400	.4327	.5144	.4735	.2341	.2926	.2633	.3684	24	Silicon				
11	.05	.44	.037	.030	.003	.014	1600	.4211	.5206	.4705	.1960	.2464	.2212	.3460		Aluminum				
12	.06	.46	.028	.035	.003	.242	1400	.3186	.3909	.3547	.1527	.1656	.1593	.2569		Aluminum				
13	.06	.56	.034	.035	.010	.266	1600	.3764	.4732	.4248	.2103	.2335	.2219	.3233	22	Steel				
14	.08	.60	.035	.032	.006	.014	1400	.3344	.3477	.3410	.1785	.1745	.1765	.2588	17	Steel				
15	.06	.50	.140	.093	.006	.256	1600	.2729	.3104	.2916	.1788	.1914	.1851	.2584		Steel				
16	.06	.47	.142	.096	.004	.008	1400	.3322	.5018	.4619	.2547	.2555	.2450	.3535	23	Steel				
17	.07	.48	.048	.112	.012	.260	1600	.1280	.1358	.1319	.1028	.0963	.0995	.1157	2	Steel				
18	.07	.49	.052	.112	.010	.004	1301	.3911	.3606	.3895	.1922	.1908	.2757	.18	Steel					
19	.07	.29	.029	.016	.009	.265	1400	.1366	.1384	.1074	.1037	.1055	.1220		Copper					
20	.06	.31	.039	.018	.005	.102	1400	.1478	.1973	.1155	.1125	.1140	.1307	10	Copper & Scale					
21	.06	.26	.030	.017	.005	.014	1400	.2849	.2984	.2916	.1649	.1711	.1680	.2298	14	Scale				
22	.06	.29	.033	.018	.123	.016	1400	.3326	.3342	.3184	.1604	.1606	.1605	.2394	15	Silicon				
23	.06	.29	.035	.048	.006	.015	1400	.2366	.2571	.2468	.1805	.1476	.1441	.1955	12	Phosphorus				
24	.06	.30	.027	.016	.004	.014	1400	.2752	.2939	.2845	.1677	.1684	.1680	.2263	13	None				
50	.02	.03	.011	.005	.002	.041	1400	.1588	.1577	.1582	.1156	.1178	.1167	.1375	11					



This and the illustration on the opposite page Show the Progress of the Corrosion of Sheets from the Heats Represented by Table 2. They were exposed at McKeesport, Pa., on July 7, 1914. The photographs were taken Aug. 24, 1915, about 13½ months later.

gave a divided stream, which of course favored oxidation. Analyses of the sheets from this heat by the Ledebr method showed an oxygen content averaging only 0.03 per cent, which is no higher than normal open-hearth steel.

A heat, made without the addition of manganese or other deoxidizer at any stage, is represented by grades 25 and 26 in Table 2. The composition of the heat, including grades 2X to 11X in Table 2, is quite similar to the grades 2 to 11 in Table 1, except that the copper (residual) is about 0.04 per cent in all grades except those to which copper was added. Grade numbers 12X, 13X and 14X, in Table 2, correspond to 12, 13 and 14 in Table 1, except the heat contained 0.05 per cent residual copper.

METHODS OF SHEET MANUFACTURE

All of the operations of blooming, rolling, sheet rolling, etc., were conducted according to regular mill practice, and were under the personal supervision of the authors. Enough sheet bars were taken from the product of each ingot to give us a large excess of sheets for our tests, and were selected so as to represent the whole ingot from top to bottom. All grades were given the same treatment and each sheet received the customary one (straightening) pass through the cold rolls. All sheets, except those which were annealed at higher temperature, were annealed at one time in the same furnace.

To determine the possible influence of higher annealing temperature one-half of the sheets of grades 2 to 14, inclusive, were annealed at a temperature about 200 deg. Fahr. higher than the normal temperature for sheets, the remainder being annealed at the usual temperature. After the annealing process twenty-four sheets required for the tests were taken at regular intervals from the piles. All sheets were 26 gage, 26 x 96 in. A strip 2 in. wide from each sheet was carefully analyzed.

Twelve sheets of each of grades 2 to 24, inclusive, were exposed at Scottdale and McKeesport, Pa., stations, while the other grades, 2X to 14X, 25 and 26, were exposed at McKeesport only. There had meanwhile been obtained in the open market, from three different sources, three lots of "pure irons," which on analysis proved to have a copper content of 0.041 per cent. Several sheets of each lot were taken and exposed exactly as received. All of the grades above mentioned, including the pure iron, grade 50, Table 1, were exposed as roof panels at McKeesport on July 7, 1914, and at

Scottdale on July 9, 1914. From many observations we concluded that the influence of the original surface oxide is slight, and is lost in the early stages of rusting, for no differences in final failure could be noticed.

Careful inspections of the sheets, made approximately once every two months, showed that the corrosive action of the atmosphere had produced a decided difference in color, the steels with a copper content of 0.25 per cent or more being distinctly darker than the others which contained only a trace of copper. At the same time these dark brown panels were smoother to the touch than the others, and the rust was denser and more adherent. Inasmuch as this same phenomenon had been noticed in former tests, it was indicated even at this early stage which steels would be the most resistant. It was also noted that several of the panels to which ingredients other than copper had been added, for instance, sulphur and aluminum, gave indications that the rate of corrosion was proceeding even faster than with those steels to which no additions had been made.

An idea of the rate of corrosion of the various grades may be obtained from the illustrations. While the corrosion at McKeesport was somewhat slower than at Scottdale, yet by a study of the photographs and tables it will be seen that the relations between the various grades are approximately the same.

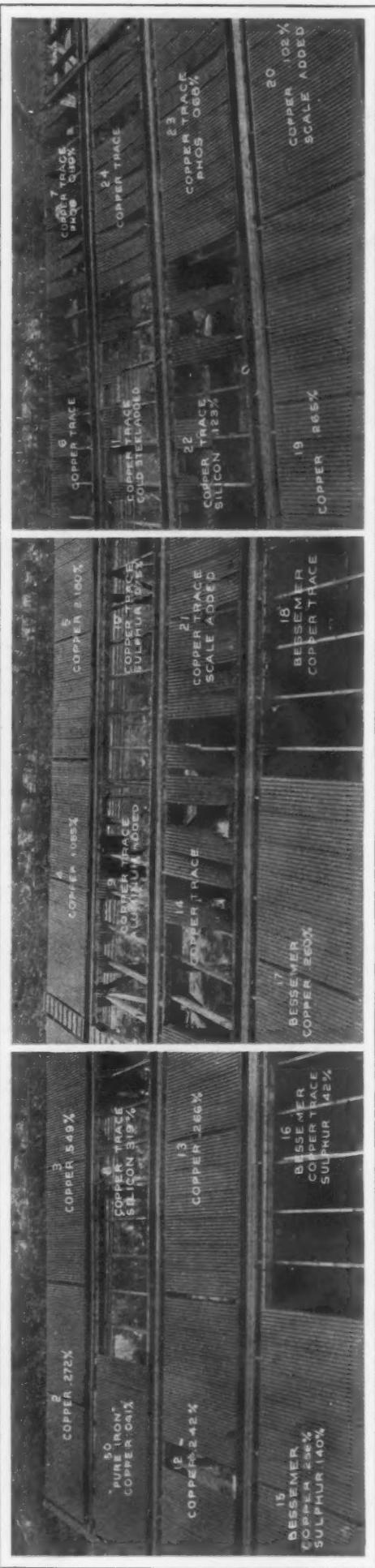
[The original research paper gives a detailed discussion of the accuracy of determining losses in weight by exposure of small test pieces.]

RELATIVE CORROSION VALUE OF THE STEELS

Table 1, under "Rank," gives the order of resistance to corrosion of the various grades, comparing only those grades annealed at 1400 deg. Fahr. The ten grades to which copper was added in amounts from 0.25 per cent to 2 per cent have taken the ten highest positions. In these there is a remarkable uniformity

TABLE 2—SHOWING LOSS IN OUNCES PER SQUARE FOOT PER MONTH FOR EACH PERIOD OF EXPOSURE

Grade	Carbon	Manganese	Sulphur	Phosphorus	Silicon	Copper	8.2 Months	10.9 Months	Average	Element Added
2X	.06	.49	.033	.029	.004	.290	.1033	.1057	.1045	Copper
3X	.04	.45	.033	.033	.004	.555	.1021	.1035	.1028	Copper
4X	.05	.46	.033	.031	.004	.990	.1038	.1022	.1030	Copper
5X	.05	.46	.031	.025	.011	1.940	.1001	.0979	.0990	Copper
6X	.06	.48	.034	.032	.002	.041	.1293	.1296	.1294	None
7X	.06	.46	.039	.035	.003	.040	.1187	.1210	.1198	Phosphorus
8X	.06	.45	.028	.030	.012	.016	.1552	.1267	.1309	Silicon
9X	.06	.47	.032	.029	.006	.037	.1241	.1301	.1271	Aluminum
10X	.06	.46	.082	.023	.004	.044	.1493	.1810	.1651	Sulphur
11X	.06	.46	.033	.032	.010	.037	.1237	.1314	.1285	Steel
12X	.06	.51	.033	.033	.004	.270	.1046	.1012	.1029	Copper
11X	.06	.41	.031	.022	.006	.314	.1072	.1047	.1059	Copper
14X	.06	.41	.031	.024	.005	.050	.1173	.1167	.1170	None
25	.06	.15	.032	.012	.005	.017	.1922	.2195	.2058	None
26	.06	.16	.030	.012	.004	.404	.1096	.1055	.1075	Copper



The Appearance of the Various Sheets, Details of Which Are Given in Table 1, After They Had Been Exposed to Atmospheric Corrosion Conditions at Scottdale, Pa. This photograph was taken about 14 months after the sheets were placed in position.

in the corrosion rate, the greatest loss being 0.1307 and the lowest 0.1138. The poorest are those to which sulphur was added (No. 10), and which contained high sulphur residually (No. 16), the latter showing losses approximately three times as great as the copper steels.

Grades 19 to 24, from a heat which was supposed to be highly oxidized, have shown somewhat lower losses than the other heats. We ascribe this to the somewhat lower sulphur content. (Compare No. 6 and 14 with No. 24.)

Grades 15, 16, 17 and 18 (Bessemer) show the accelerating effect of very high sulphur, but the addition of 0.25 per cent copper to the same steel has made the results quite comparable with normal copper steels.

In Table 2, grade No. 2X to 14X, to which the same additions were made as to No. 2 to 14 (Table 1) we find that as low a copper content as 0.04 per cent seems to have materially lessened corrosion. (Compare No. 6X with No. 6, also No. 14X with No. 14, and No. 10X with No. 10, etc.) From the latter we learn that 0.04 per cent copper partially neutralizes the influence of sulphur as high as 0.082 per cent.

Panel 25, from a heat to which no deoxidizer was added and which was comparatively low in manganese, shows a corrosion rate greater than that of normal basic open-hearth steels, indicating no benefit because

The analyses of these sheets were as follows:

Type A, Low Copper, Cu. 0.04 to 0.05 Lot 1, Per Cent	Type B, Low Copper, Cu. 0.04 to 0.05 Lot 2, Per Cent
Carbon 0.013	0.020
Manganese 0.04	0.094
Phosphorus 0.004	0.049
Sulphur 0.030	0.018
Silicon 0.002	0.002
Copper 0.027	0.020
Auminum 0.031	0.045
Aluminum 0.095	....

Observations showed that in less than one month Type A, lot 1, was rusting badly and the rust had the light brown color which had been found to be characteristic of the more rapidly corroding steels. In less than two months it had become very rough, resembling the most rapidly rusting steels containing added sulphur and silicon. In nine months it had become as thin as paper at the edges, and in twelve months had frayed and broken at the bottom, but did not break transversely when pressed. In fifteen months it had broken through near the bottom, though fairly strong at the upper end. After eighteen months 1 sq. ft. of it had rusted away at the bottom, and it was cracked half way up; it cracked transversely when lightly pressed near the top.

Type A, lot 2, showed a thick, light brown rust after about two months' exposure. After four months there was a thick, light brown scale. After six months

exposed for approximately equal periods, though at slightly different seasons, in the Pittsburgh atmosphere were: For Type A, lot 1, after six months, 2.70 oz. per square foot; for Type A, lot 2, after five and one-half months, 2.34 oz. per square foot, and for Type B, after five and two-thirds months (October to April), 1.64 oz. per square foot.

The test pieces, of which there were three in each case, were exposed for three months longer, after cleaning with ammonium citrate solution and weighing, the loss for Type A, lot 1, being 1.26 oz. per square foot; for Type A, lot 2, 1.66 oz. per square foot, and for Type B, 0.99 oz. per square foot. The losses of weight when exposed under exactly the same conditions were inversely proportional to the small and slightly varying copper percentages.

Further investigations show that the progress in rusting under the original rust coat is much more rapid in the case of the plain steel than in the case of the copper-bearing steel, and materially less rapid in the case of the copper-bearing steel than in the case of the pure iron. It should be noted, however, that this pure iron contains enough copper to account for its approximating in corrosion resistance the copper-bearing steel.

It is of great interest to note that corrosion practically stopped in the case of the copper-bearing steels after the fourth month. The rust had formed an efficient protective coating.

SUMMARY AND CONCLUSIONS

the sheets were thin at the bottom, but could not then be broken by light pressure. After nine months the sheets were rusted away at the bottom. One sheet was full of holes in the lower half and the rusting had proceeded further than in the case of the lot 1 at this period. After twelve months the sheets had become detached and were rusted so badly that they could be broken easily by hand in any part. The more rapid corrosion of the second lot of this pure iron is believed to be due to the lower copper content.

Type B contained more than twice as much copper as the pure iron of type A. The percentages of copper in the different sheets were 0.043, 0.044 and 0.048, which places it in the class with the pure iron in the main test and with the sheets 6X and 14X of Table 2. After six months they were graded as showing no more corrosion than the copper-bearing steels which had been exposed for seven months. After eight months they were graded as being no longer as resistant to corrosion as the copper-bearing steels containing approximately 0.25 per cent copper. The rust was quite rough, resembling 7X, 14X and the pure iron in the other tests. After eleven months, while the rust was rough and deep, there was no perceptible thinning at the edges and no sagging. After fourteen months one sheet broke when lightly pressed. After seventeen months one sheet was perforated and cracked. The second sheet was cracked and had a small perforation. The third sheet was not then broken through.

The quantitative weight losses of the test pieces

follows:

All steels : 100 at McKeesport to 173 at Scottsdale.

Copper steels : 100 at McKeesport to 133 at Scottsdale.

Plain steels : 100 at McKeesport to 190 at Scottsdale.

The benefit of higher annealing temperatures in the case of plain steels is approximately 12 per cent greater endurance, while for copper steels it is practically negligible.

ADDITIONAL PURE IRON TESTS

In addition to the tests reported above one of the authors (Mr. Handy) has conducted some tests on the behavior of low copper pure irons under atmospheric influences, and also on the progress of rusting during successive periods of exposure.

Two manufacturers of pure iron furnished sheets of their material, which were analyzed, corrugated and included in the weather exposure tests at McKeesport. The sheets were of 26 gage, except in the case of Type A, lot 1, which had a thickness of 0.022 in., instead of 0.0185 in. They were first exposed on July 16, 1914, Nov. 7, 1914, and Aug. 5, 1914, respectively.

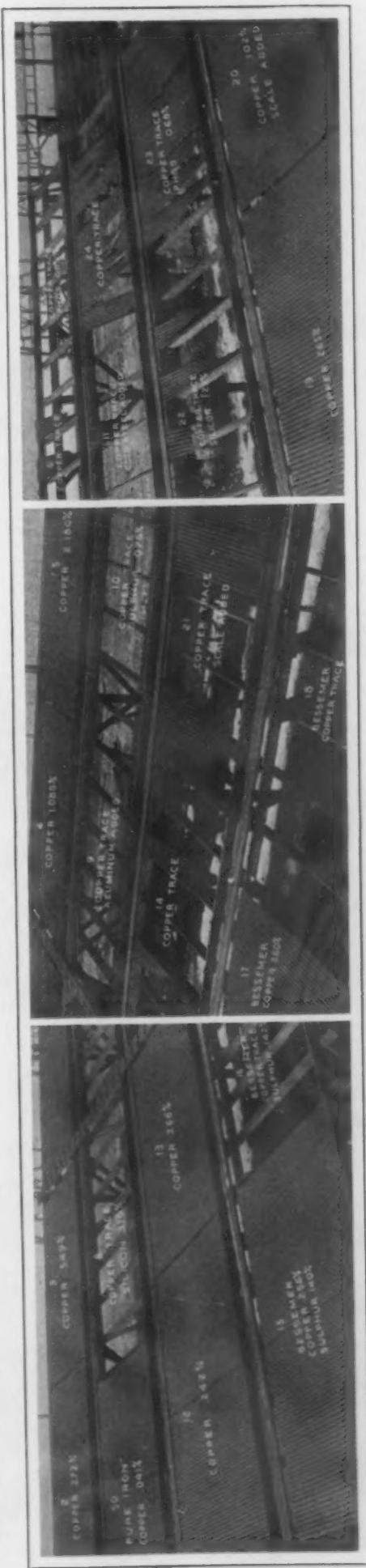
Sheet steel or iron containing copper shows greatly increased corrosion resistance when exposed to atmospheric conditions. The most effective amount of copper to be used for this purpose is approximately 0.25 per cent. Smaller amounts of copper down to as little as 0.04 per cent have a considerable influence in lessening corrosion, but the results are not as good as with the higher amount mentioned above. Work previously done by one of us has indicated that 0.15 per cent copper is in nearly all cases as efficient as 0.25 per cent. Higher amounts of copper up to 2 per cent give little or no added benefit. Copper is as necessary, in the pure irons, to insure corrosion resistance, as it is in normal open-hearth and Bessemer steels.

The addition of phosphorus to open-hearth steel slightly lowers the corrosion rate. Silicon, while probably without effect in the amounts normally present in open-hearth and Bessemer steels, accelerates corrosion when added in amounts from 0.10 per cent to 0.30 per cent.

The addition of small amounts of aluminum probably has little influence on corrosion. These tests indicate it to be harmful rather than beneficial.

The addition of sulphur to steel greatly increases the corrosion rate and when residually present in abnormal amounts, it is probably also detrimental from a corrosion standpoint.

The addition of cold steel to molten steel does not



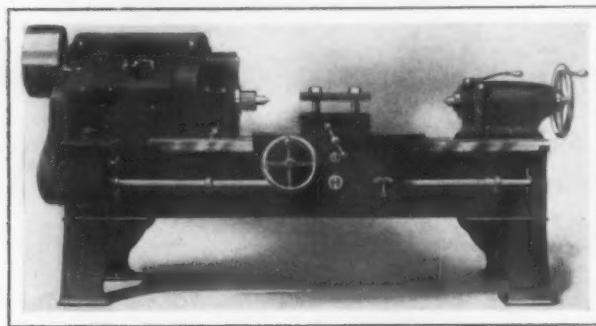
The Appearance of the Same Grade of Sheets as in the Illustration on the Opposite Page After They Had Been Exposed to Atmospheric Corrosion at McKeesport, Pa. This photograph was taken about 17 months after the initial exposure

lower the corrosion rate, but, if it has any influence at all, it is to increase the corrosion.

Results obtained by loss in weight determinations on small test pieces are found to be accurate and valuable when determining the relative corrosion resistance of various sheet metals. The method of cleaning such test pieces with ammoniacal ammonium citrate solution is found to be the most convenient and accurate thus far investigated.

Manufacturing Lathe with Few Speeds

An 18-in. lathe for general manufacturing use, as well as for shell machining, has been placed on the market by Robert H. Snider & Co., 1524 Chestnut Street, Philadelphia, Pa. As the lathe is designed par-



An 18-In. Manufacturing Lathe Having No Back Gears and Only Eight Spindle Speeds

ticularly for shell work, only eight spindle speeds are provided, four changes being secured by a selective sliding gear headstock from a single-pulley drive, and this number is doubled by the use of a two-speed countershaft. It is pointed out that this reduction in the number of spindle speeds enables a general run of manufacturing work to be machined, since the pieces handled day in and day out do not vary to any great extent in diameter for any particular lathe, and the cutting speed is generally more or less uniform.

The general construction of the lathe is that of a heavy type manufacturing tool with the parts of large proportions and capable of standing severe duty. The headstock, which is the distinguishing feature, is comparable to a four-speed gearset of an automobile. In this arrangement the sliding gears are mounted on the initial driving shaft directly above the lower shaft, which has the gears keyed fast to it and carries a pinion meshing with the large gear on the lathe spindle. As a single lever controls the movement of the sliding gears, it is pointed out that it is impossible to engage opposing gears. The friction clutch in the driving pulley is controlled by a lever which is interlocked with the gear shifting lever, an arrangement which is relied upon to insure the clutch being released before the gears can be shifted and also that the change gears are properly in mesh before the clutch can be thrown in. The change gears revolve in a bath of oil contained in a reservoir in the headstock, while the spindle bearings are lubricated by oil wells equipped with a ring oiling device.

The following table gives the principal dimensions and specifications of the lathe:

Swing over bed, in.....	18
Swing over carriage, in.....	11 1/4
Length of bed, ft.....	8
Distance between centers, in.....	38
Net weight, lb.....	4,100

The lathe is equipped with rod feed and a plain rest for use in machining shells, but other attachments to adapt the machine for general manufacturing work can be furnished.

The Milwaukee Efficiency Association, recently expanded to include the executives of industrial enterprises within a radius of 50 miles of Milwaukee, Wis., will hold its next meeting at the Hotel Pfister, March 9. On March 23 the association will be addressed by C. E. Knoepfel, New York City, who will speak concerning "Industrial Preparedness."

Newark Foundrymen's Association

The Newark Foundrymen's Association, at its monthly meeting March 1, was addressed by Wilfred Lewis, president Tabor Mfg. Company, Philadelphia, who described molding machines and their operation. He referred to some of the very early methods of molding and brought out the fact that the practical use of machines had only developed in the last 25 years. He gave an idea of some of the earlier machines, pointing out their defects, then illustrating with lantern slides some of the appliances which have become indispensable.

Mr. Lewis referred very briefly to the service department maintained by his company, one function of which is to fix the proper time and method required to produce a specified casting. H. P. Macdonald, president of the association, expressed the opinion that there was a great future for such a bureau in view of the experience which the men connected with it would gather in a great variety of shops. All foundrymen, Mr. Macdonald said, knew of instances where men using new machines had turned out work at the rate common with old machines and methods. Mr. Lewis arose to say that the service department was really extending to the foundry the principle used in the machine shop, in fact, it was comparable with the laboratory system.

James Flockhart, Maher & Flockhart, pointed to the difficulties experienced in selecting the machines most adaptable for a jobbing foundry, to which Mr. Macdonald responded that this was one direction where a service department might help. Mr. Flockhart stated that in his opinion perhaps 50 per cent of the work in a jobbing foundry will continue to be done by hand for the reason that the work is so varied, and because so many of the castings are made by embedding the patterns in the floor.

Prior to Mr. Lewis's address the Fischer Sweeney Bronze Company, Hoboken, N. J., was elected to membership. J. Smylie Kinne, secretary of the association, made an appeal for a more active canvass for new members. Incidentally he told the members regarding a New Jersey company which had been having trouble with castings made in the West and said he believed that satisfactory castings could be made in Newark for the firm in question. Mr. Macdonald urged that instances of the kind be brought before the association when they came to the notice of members.

Philadelphia Foundrymen's Association

The 256th meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, Wednesday evening, March 1, and was presided over by Thomas Devlin, the association's president. Buell W. Nutt, secretary of the Strong, Kennard & Nutt Company, Cleveland, gave an address on eye protection for foundries, illustrated with lantern slides. The speaker showed how to test goggles by dropping steel balls on the glass. He also told how to treat the eyes and to keep them free from foreign particles.

The association had been invited to join the Philadelphia Bourse with a view to co-operating in the improvement of transportation, wharf and terminal facilities for the Philadelphia of the future. The result of the discussion on this subject was the appointment of Thomas Devlin and Howard Evans, the secretary of the association, to attend a meeting at the Bourse to consider the matter, and the committee will report at the next meeting of the association.

The Morgan Spring Company, Worcester, Mass., on Monday, Feb. 28, purchased the entire business of the National Mfg. Company, including its merchandise, good will and real estate. The plant will be operated at the old location on Summer and Union streets, Worcester, and the business will be continued under the old name of the National Mfg. Company, making its established line of wire goods and adding to it, from time to time. The Morgan Spring Company, as the owner of this plant, is in a special position to manufacture the line of wire goods to advantage, having facilities for producing its own wire.

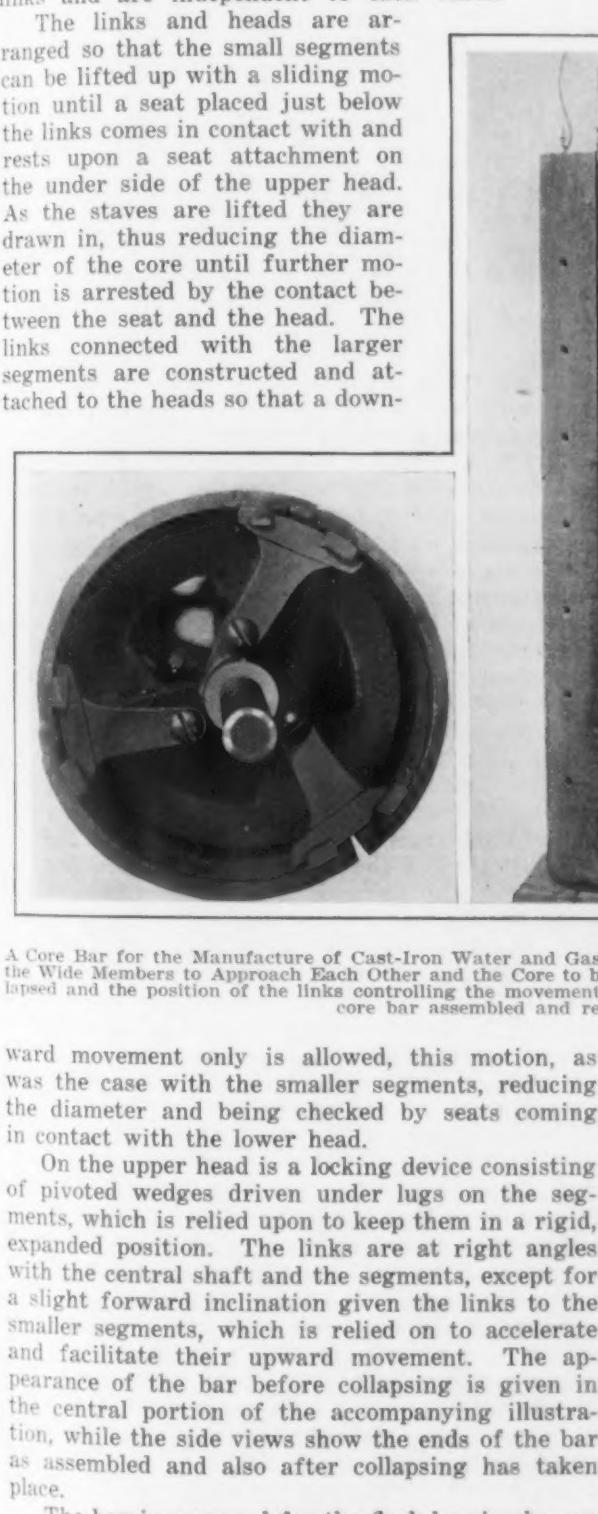
Collapsible Core Bar for Casting Pipe

A collapsible core bar to be used in the manufacture of cast-iron water and gas pipe has been patented by C. M. Sims and H. W. Lee, Anniston, Ala. This arrangement is designed as a substitute for the rigid bar which has to be wound with hay rope and coated with clay and baked before it can be used. The bar consists of an outer shell of six segments, three of which are comparatively wide while the others are relatively narrow, attached to a central shaft by circular heads at each end, a set screw being employed to fasten the heads to the shaft. The segments are attached to the heads by links and are independent of each other.

The links and heads are arranged so that the small segments can be lifted up with a sliding motion until a seat placed just below the links comes in contact with and rests upon a seat attachment on the under side of the upper head. As the staves are lifted they are drawn in, thus reducing the diameter of the core until further motion is arrested by the contact between the seat and the head. The links connected with the larger segments are constructed and attached to the heads so that a down-

ward movement only is allowed, this motion, as was the case with the smaller segments, reducing the diameter and being checked by seats coming in contact with the lower head.

On the upper head is a locking device consisting of pivoted wedges driven under lugs on the segments, which is relied upon to keep them in a rigid, expanded position. The links are at right angles with the central shaft and the segments, except for a slight forward inclination given the links to the smaller segments, which is relied on to accelerate and facilitate their upward movement. The appearance of the bar before collapsing is given in the central portion of the accompanying illustration, while the side views show the ends of the bar as assembled and also after collapsing has taken place.



A Core Bar for the Manufacture of Cast-Iron Water and Gas Pipe in Which the Narrow Bars Can Be Collapsed to Permit the Wide Members to Approach Each Other and the Core to be Withdrawn. The end views show the bar assembled and collapsed and the position of the links controlling the movement of the narrow bars, while the central portion is a view of the core bar assembled and ready to be placed in a pipe

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The bar is prepared for the flask by simply covering it with clay while the segments are expanded and locked and smoothing the outer surface. It is then baked and blacked in the customary way and placed in the flask. After the pipe has been poured,

the locking device is loosened and a crane is attached to the projecting ends of the small segments by a triangle of wire. A single upward pull collapses and lifts the bar out of the flask, the smaller staves being drawn upward and moving inward on the pivoted links until their seats strike the heads. The moving inward of the smaller segments breaks the continuity of the outer shell and causes the larger segments, which are unsupported and attached to pivoted links, to drop and be drawn in. When the small segments come to rest, the upward movement of the crane lifts the whole bar, the diameter of which has been reduced by several inches at all points, it being emphasized that it comes from the flask freely and easily.

It is pointed out that the bar assumes its expanded shape by its own motion as soon as it is placed by the crane, it being simply necessary to lower the bar into a pit after drawing it. The weight of the bar resting on the larger segments is relied upon to force them up until the connecting links are at right angles, while the weight of the smaller segments causes them to drop back into their expanded position. The locks are knocked in place, and the bar is ready to be used again, the time required to ex-

pand the bar after it has been collapsed being less than 1 min.

Snyder Furnace to Supplement Converter

The Snyder Electric Furnace Company, Chicago, is installing a 3000-lb. electric furnace in the foundry of the Sivyer Steel Casting Company, Milwaukee, Wis. The manner in which this furnace will be used to supplement the present converter represents somewhat novel practice, in that the tendency of the cupola metal to run up in sulphur will be counteracted by subsequent treatment in the electric furnace, the metal being finished in that furnace following the first blow in the converter. In turn, the sprues from the electric steel castings will supply an exceptionally high grade scrap for the cupola charge.

The car shops of the Chicago, Milwaukee & St. Paul Railway Company are engaged in the construction of 500 large ore cars on a special order recently issued by the management. The company is said to be preparing for the greatest rail movement of iron and copper ore in the history of the country during the coming season.

The Work, the Worker and His Wages*

Various Features of Wage Systems of Scientific Management, and an Answer to the Objections of Workers to Increasing Output

BY F. B. AND L. M. GILBRETH†

One of the most important problems that has to be solved by any organization is the problem of pay. This is especially true of an organization operating under scientific management. In the first place, there has been so much discussion of the matter that the men who became members of the organization are prone to be critical upon the subject. Another reason is that the education of the workers under this type of management occupies so much time, and is so expensive, that it is a decided loss to have a trained man leave because of dissatisfaction with his pay. The third is—that this type of management depends absolutely for its permanence and success upon the spirit of co-operation that exists, and it cannot afford to have any difficulty over questions of pay because of the resulting bad effect upon the spirit of co-operation. Finally, the pay system under the scientific type of management is scientifically determined. For all of these reasons it is essential, for the benefit of every one concerned, that the type of pay system, or systems, to be used be thoroughly understood.

THE THREE TYPES OF WAGE SYSTEM

All systems of wages fall under one of three kinds: 1. Wages given for time spent. 2. Wages given for output produced. 3. Wages given for a combination of the first and second. Neither of the first two types is by itself entirely satisfactory, and, therefore, the successful method must be some combination of the two. It must be understood that scientific management does not prescribe the same pay system as the best one for all cases. It does prescribe certain general principles to which the pay system must conform to be satisfactory, and, after that, it recommends a particular modification to be used, to be determined by measurement of the conditions and of what will best satisfy the conditions.

NECESSARY FEATURES OF WAGE SYSTEMS

One qualification laid down by scientific management of the system of pay used is that it must be a just compensation of the worker for the amount of time and effort that he is required to expend. That is, the pay must be sufficient to act continually as an incentive to induce the worker to perform the work, and as a reward that is just and honest. This amount must be decided in advance and standardized before the worker who is to do the work permanently is set to work. This, naturally, implies that it is the result of measurement, involving the determination of: 1. The type of worker who will best succeed at the work. 2. The proper allowance for variation from this type of the man to be assigned to the work. 3. The standardized method, equipment and tools. 4. The allowance for fatigue. 5. The amount of output to be expected. 6. The time in which it is expected that the work will be completed. 7. The meeting of the minds of the parties as to what both employer and employee do in the performance of their agreement.

Another qualification prescribed for the pay

*Copyright, 1916, by F. B. and L. M. Gilbreth.
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system is that the amount of money to be given as wages should be properly distributed. This depends upon the proper classification of the work, and the proper making out of the promotion system. It is necessary that the work be so divided and arranged that every man shall receive a fitting increase in wages with his progression in the organization, and this should not be less than the prevailing proper rate of wages for this particular kind of work in the same vicinity, plus the motivation percentage for persistent continuity of endeavor. Unless the man does receive this increase in pay, his promotion will naturally not satisfy him as it should, and, unless this increase in pay means a simultaneous increase in profit to the organization, the organization cannot prosper, and the element of permanence of the pay system will be lost, due to lack of prosperity and co-operation.

Another qualification of the pay system is that it must provide for the ever changing conditions of the learning period. A man must receive sufficient incentive to change from his usual method to the particular method desired. The transition period, when old habits are being broken up and new habits are being formed, is a difficult and a crucial one. In all kinds of activity, in all ages and stages of life and work, there must be a strong incentive to lead one through this period. The pay system must, therefore, provide some form of wage or bonus to be given to the learner to induce him to co-operate willingly and to follow instructions. This learning bonus will naturally vary with the difficulty of the work, the psychological attitude towards the new method, existing in the mind of the learner and in the plant, and the stage of installation of the new methods in the plant. The learner's bonus is naturally smaller than that of the worker who has become skilled, but at the same time it is large enough to keep up his interest. It lasts as a learner's bonus until he becomes a skilled worker, with the skilled worker's high earnings, or until he shows to himself, as well as to those responsible for his teaching, that he has been assigned to the wrong kind of work and should be transferred to some other type.

EQUAL PAY FOR EQUAL EFFORT

Perhaps the most important qualification of the pay system is that the wages that it prescribes shall be such as can be maintained, that the rate once set shall be permanent, or at least the same effort should never earn less. The great fear in the minds of the men when they first come under the new type of management is as to the maintenance of the rates of pay. They naturally fear that the moment the output increases the rates will be cut. Both managers and men must sooner or later realize that, if the new type of management is to succeed, rates of pay must be accurately set in the first instance, and must be maintained.

The answer to this phase of the problem lies in a clearly defined method of measurement, that will determine the proper rates accurately. The rates properly determined will be such that the worker

need not fear to increase his output, and the management need not fear to have this output increased, as such an increase, when set by time study, can only result to the betterment of both. The wages paid, then, must be enough to satisfy the worker, must be so arranged that they progress with promotion, and must be so maintained that the worker can feel absolutely safe, and free to produce just as large an amount as his capacity and strength will allow.

There are various questions that will arise, which should be here considered, and which are advanced by different types of thinkers who consider the problem.

One will ask, "How can the organization afford to pay such high wages as are customary under scientific management, higher than are paid by the surrounding plants, operated under the old type of management?" The answer to this is that new, less wasteful and more efficient methods are obtained by motion study, analysis, measurement and synthesis, and are standardized before any radical changes in the wage system are made. This procedure alone results in a saving which justifies an increase in pay to those workers who co-operate. But the increase in pay comes from savings only. It is no eleemosynary scheme.

WHY THE WORKER DOES NOT GET ALL THE SAVINGS

Another will inquire, "Why does not the worker get all the savings?" The answer to this is, that in the first place, a certain amount of the savings must go to defray the cost of managerial investigations, and for installing the new management, with the improved methods and devices which it brings. A certain portion of the savings must go to those who expect to gain financially through the profits of the organization in order that they may have an incentive to install the new type of management. There is enough money still left to pay the workers that motivation percentage necessary to satisfy them and to enlist their full co-operation. It would be approximately correct to state that in the past the savings have been divided about in halves after deducting the costs of installing the new management; that is, one-half has gone to the workers in the form of increased pay and the other half to the owners in the form of increased profit.

THE QUESTION OF FATIGUE

The third type of inquirer will ask, "Why does not the high pay incite the worker to overwork?" The answer to this contains at least two parts. In the first place, the amount of work to be done in a given time and to be paid for at a given rate is not prescribed for a superman, but simply for the average worker of the type selected. In no case is it desired that the worker shall do more work in a day than will send him home at night with no more fatigue than he can easily overcome before coming to work the next morning.

To obtain his high rate, he must not be over-fatigued from the previous day. If he is over-fatigued, then he will not have the incentive or power to enable him to earn the high wages the next day. It is understood that he passes the time between working hours normally, in rest and recreation. In the second place, the study of fatigue has been, and is becoming more and more, a large element in the science of management. The proper estimation of the importance to the organization of conserving its workers also acts as a safeguard against overfatigue. It is only within the past few years that it has been gen-

erally realized that the amount of output and the amount of fatigue are not synonymous terms.

THE REDUCED PRICE RATE

The fourth type of inquirer, and he is usually one of the workers, will inquire, "If I make more pieces or more output, why should I get less apiece for them?" This questioner will have a line of thought something like this, "I am receiving, say, \$2 a day for making 100 pieces in a day. Under the new system I am offered, say, 50 per cent advance or \$3 for an output, say, three times as large, that is, for 300 pieces in a day. My old rate was 2 cents apiece. The new rate is 1 cent apiece. Now why, when I make three times as many, should I get only one-third as much apiece for what I do? In the first place, I doubt if I could make three times as many. In the second place, if I can, I shall be entirely worn out. How can you justify this?"

The answer to this argument is that it is not necessary to work three times as hard in order to triple the output under the new motion-studied method. It is more than likely that it is not necessary to work much if any harder under the new method, which will cut down the amount of exertion necessary, and eliminate a large portion of the fatigue. Again, it is not only possible for the worker to make the increased output in the time set, but it is also, if he has been assigned to the right job, easy for him to do it. Usually he will voluntarily choose to do even more than he has been asked to do, and gain a still greater increase in earnings.

If this type of questioner be shown object lessons in the form of the new devices, standardized conditions of providing him with tools and materials and has demonstrated the methods to be used before he is asked to adopt them, he will receive a satisfactory answer to his questions. He then will become naturally an advocate of the pay system involved. It must always be remembered that the new way is the result of analysis, measurement and synthesis of the least wasteful methods and motions.

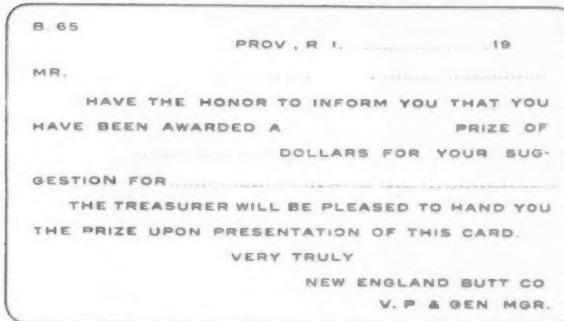
NECESSARY CHANGES IN PAY

The fifth type of questioner will ask, "How is provision made for necessary changes?" The brief answer to this is "No change in rates is ever made unless there is a change in method, and then it is approximately pro rata." This answer, however, is not completely satisfactory, as it is self-evident that it would be very simple to change methods at any time it was desired to change rates. But after the new methods have once been standardized and put in some sort of permanent form, such changes as are advisable and necessary do not lessen the worker's earnings in any case. It cannot be too often emphasized that any change in the rates that is not of immediate benefit to both worker and owner, is an injury to an organization. Changes there must be, of course, but these are serious matters and must be determined by time study, and the worker's total earnings must not be decreased. Then they will be adopted with the approval of all concerned, and with no injury to the spirit of co-operation existing.

SUGGESTION BOXES

This question of changes is so important that much time and attention have been devoted to it. Much help has been afforded in the solution of the problem by the Suggestion System, the plan of which is as follows: In various parts of the plant

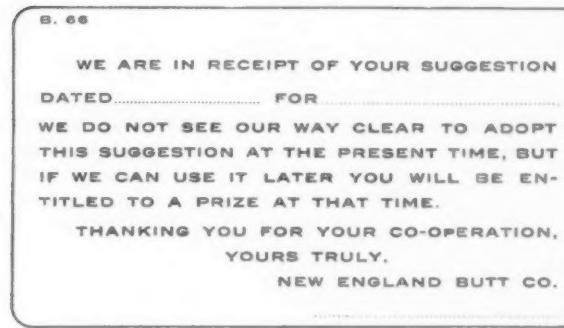
racks holding Suggestion Cards, or slips, are placed. Under these are locked boxes, similar to letter boxes, in which these cards or blanks, may be placed, when they have had the suggestion written on them. Some of these Suggestion Boxes, as they are called, are placed where the



A Durable Card Is Given the Winner

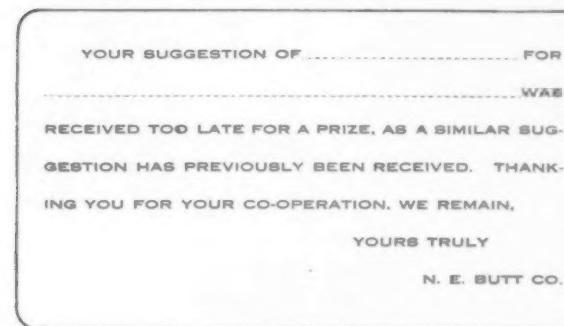
busy man, passing daily, may drop his suggestion with the least waste of time. Others are placed in less prominent places, where the shy worker may write and deposit his slip without being disturbed by others. All boxes are opened regularly, preferably weekly or oftener, the suggestions judged, and, if signed, prizes of greater or less value for the suggestions that have been offered are awarded, but only when the suggestions are adopted.

Every one in the organization is expected to



Acknowledgment of a Meritorious Suggestion

make suggestions, and urged to suggest any possible improvement, whether or not it be along the line of his own special work. The highest prizes are given for those suggestions that will reduce costs, increase outputs, make better products, eliminate unnecessary fatigue or any other form of waste. The prizes, which are usually money, are large enough to act as a satisfactory incentive.



The Case of a Suggestion Antedated

The winner of a prize will receive an announcement card of durable, stiff paper, with rounded corners, which may be preserved by the winner, and handled often without danger of its wearing out. If the suggestion received is one that has previously

been received, a slip stating the fact is given to the suggestor.

It is only necessary to note here that any suggested changes that come in this way directly from the workers themselves, will naturally be a great help in installing changes needed, and that the rewards for them will also provide a welcome addition to regular wages.

It is necessary to keep constantly in mind that the problem of pay is one upon which close attention must be continually concentrated. When this pay problem based upon time study is solved to the satisfaction of all concerned, an important part of the success and the permanence of the installation of scientific methods of management is secured. That it is possible so to solve the problem to the satisfaction of both employer and employee long practice has proved.

Important as the basis of pay is, it must always be remembered that any pay system by itself is but a small fraction of the problems of scientific management. Great gains can be made even under the day-work pay system provided the methods are determined by the methods of measured functional management.

Manganese Ore Imports and Production

Manganese ore imports into the United States in December, 1915, according to Government data just published, were 69,274 gross tons. These are the largest monthly receipts since the war started, the best previous total being 57,867 tons in August, 1915. The total imports for 1915 were 320,782 tons compared with 283,294 tons in 1914 and 345,090 tons in 1913. The declared official value of the 1915 imports is placed at \$2,633,286 and of the 1913 imports at \$2,029,680. The average monthly imports in 1915 were 26,731 tons.

Manganese ore imports into Great Britain in January, 1916, were 32,111 gross tons against 39,413 tons in January, 1915, and 39,271 tons in December, 1915. The January imports were about 1000 tons in excess of the monthly average for 1915, which was 31,443 tons.

The manganese ore output of the United States in 1915, according to estimates of the U. S. Geological Survey, did not exceed 6000 gross tons, as compared with 2635 tons in 1914. Important exploratory work, to which there was the impetus of a shortage of foreign ore, has not resulted in the production expected. A shortage of high-grade manganese ores, used in the manufacture of flint glass and dry batteries, has caused several companies in these lines to close. Supplies of ore from Brazil have been more than twice the average for the preceding three years.

New Timken Heat-Treating Plant

The Timken-Detroit Axle Company has recently started construction on a new plant that will be devoted to the heat treating of axle parts. This is the seventh addition to the Detroit factories since the beginning of 1916, and will cost approximately \$300,000 when completed. Two specially built rotary furnaces will be a feature of the equipment. The heat thrown off by the furnaces will be exhausted by a blower system for the comfort of the workmen. The building will be 40 x 330 ft. in plan and three stories high. The heat-treating department, occupying the entire first floor of the new building, will have a 23-ft. ceiling and steel set windows. The upper two floors will be used for manufacturing operations on the stock as it comes from the furnaces. The heat-treating plant is to be connected with the large forge shop, recently completed, by a tunnel which runs under the main building of the Timken Detroit plant. forgings will be brought to the heat-treating furnaces through the tunnel on electric industrial trucks.

The United Gas & Fuel Company, Hamilton, Canada, announces that it will erect a large by-product coke-oven plant.

SCRAP-CUTTING MACHINE

Machine Used in Germany for Preparing Turnings for Packing

BY ROBERT G. SKERRITT

R. Philipp, a German engineer, has devised what might be properly termed a mincing machine which cuts into small bits all sorts of metal turnings, and in this way effects substantial economies that materially improve the market value of this particular kind of scrap. In the first place, he makes it possible to save in space something like 80 or 90 per cent, so that the waste materials, when ground up, occupy approximately about one-tenth of the room ordinarily needed for turnings as they come from lathes. Owing to its reduced bulk and lowered storage charges it brings better prices from the purchaser. It can be readily freed of oil by means of centrifugal separators and that iron and steel scrap in this form can be separated magnetically from other scrap material is a factor in its preparation for further use.

In the development of the machine the inventor had the support of Henschel & Son, locomotive manufacturers at Cassel, and the Magnet Works, Ltd., at Eisenach. The last-named have to-day the sole rights to the patents.

A peculiarly formed spindle is made to revolve in a funnel-like hopper. The inner surface of the latter is lined with spiral grooves which narrow as they converge toward the lower and smaller opening. Corkscrew-like ribs on the shaft or spindle progressively press the turnings into the grooves upon the sides of the hopper and thus force them toward the smaller outlet, during which the scrap is broken up. Therefore, when the hopper is well filled the turnings are virtually subjected to a mincing process. The relation between the two parts is such that when the spindle is making 30 r.p.m. 4800 cuts are made in that interval by the 8 ribs formed by the grooves on the hopper surface and the 20 ribs on the shaft.

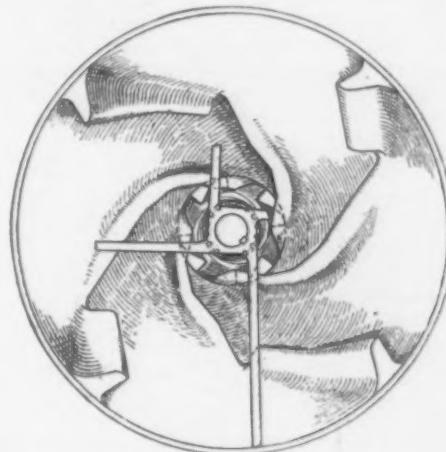
In effect, the ribs and grooves at their upper limits form a grid which prevents large foreign bodies from getting by. Smaller foreign bodies are gradually ground up in their journey downward and can pass through the machine without injuring the apparatus. Thus the big obstacles are promptly detected and can be removed at leisure because they cannot work downward.

The space requirement is moderate. In the case of the small machines for medium-sized shops, the upper edge of the hopper is just high enough to enable the

more than 10 or 11 sq. ft. of floor space. Some of the small machines are mounted upon wheels which facilitate their moving about to any desired point, while others are stationary.

In large metal-working establishments the cutting machine itself is the smallest part of such an equipment. The idea is to deliver turnings by the carload to the hopper, and then to carry the ground material by means of a conveyor to overhead storage bins from which it can be loaded by gravity into cars or trucks as desired.

Records show that the small model calls for an average of about 3 hp., but as high as 10 hp. may be needed in cases of momentary overload. The largest



Looking Down Into the Hopper Which Receives the Turnings

amount of scrap dealt with by one of the Philipp cutters was some 7700 lb. of manganese copper turnings disposed of in 20 min. A 25-hp. direct-current motor was employed, the current being of 250 amperes and 220 volts. This was a working test, and was made by Henschel & Son with a machine of their own manufacture and prior to its permanent installation in their plant. Without going into details, but allowing for wear and tear, overhead charges, power, wages and original cost, Henschel & Son, after a six months' trial, found that the entire cost of using the Philipp apparatus did not exceed 32 cents (1.33 marks) per ton of scrap cut up. But subsequent use proved that the average cost of the service per ton was inside of one mark.

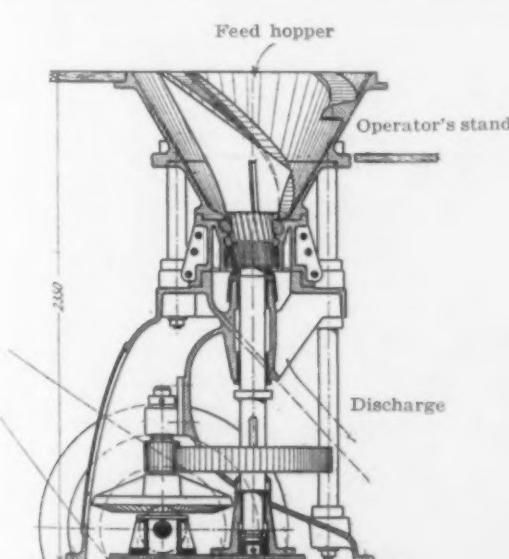
Copper Exports Very Large and Increasing

Exports of copper as pigs, ingots, bars, etc., from the United States, judged by those for September, October and November, 1915, are increasing rapidly, the average for those three months being 54,318,731 lb. per month, or at the rate of 651,824,772 lb. per year. The following table of Government exports shows the comparative figures:

	Pounds	Pounds per Month
September, 1915	49,453,987	
October, 1915	46,624,677	54,318,731
November, 1915	66,877,529	
11 months ended Nov. 30, 1915	596,199,399	54,199,945
11 months ended Nov. 30, 1914	784,602,473	71,327,498
11 months ended Nov. 30, 1913	843,288,290	76,662,571

The November exports were unusually large, or at the rate of 702,530,348 lb. per year. The present export rate, while less than in previous years, is unusual when it is recognized that Germany previous to the war took about 45 per cent of the exports from this country, but is now taking none. Belgium and Austria are also credited with none from this country. Of the exports to Dec. 1, 1915, France took 201,392,300 lb. or more than one-third, and Great Britain 180,263,068 lb. Both amounts greatly exceed former records.

The Western Iron & Foundry Company, manufacturer and contractor, structural and architectural iron work, Second and Santa Fe streets, Wichita, Kan., has about completed an addition, 40 x 50 ft., of concrete and steel.



Elevation of the Machine for Cutting Turnings

workman to feed scrap into it comfortably. If desired, a magnetic separator can be attached with a suitable receiver to catch the material so attracted. Such a machine with electric motor attached does not require

American Investments in South America*

A Natural Field for Capital from This Country, and Our Raw Materials Should Be Drawn as Far as May Be from That Source

BY PERCIVAL FARQUHAR

As the Monroe Doctrine in its widened application requires us to keep open the trade routes with South America in time of war as well as peace, it is to our advantage to make our foreign investments preferentially in South America, and to make it as far as possible our source of supply of raw materials and articles for which we must go abroad, so as to risk the least derangement to our business through outbreak of war or other circumstances over which we have no control.

SOUTH AMERICAN GOVERNMENT SECURITIES

The investments in South America will naturally be in railroads; public utilities in cities; hydroelectric development; properties whose products are consumed in the United States, and government, state and municipal bonds; representing approximately the order of safety according to past experience.

For instance, in Costa Rica the bonds of the Costa Rica Railway have for years been quoted at 95 per cent to par, while the Costa Rica government bonds were standing at 25 per cent to 35 per cent, and the railroad and government securities of Guatemala show similar price relations. Even in great countries with stable governments, like Argentina and Brazil, the national governments were on a 5 per cent basis at a considerable margin below par, while the gilt-edged railroads such as the Buenos Aires Southern Railway, Buenos Aires Western Railway, Central Argentine Railway, and the Sao Paulo Railway, sold their bonds on a 4 per cent basis at near par.

The individual states and the municipalities, being without diplomatic relations, and for other more cogent reasons, have been compelled generally to issue their securities on a lower plane than the federal governments. Particularly has this been the case with municipalities, owing to a tendency to extravagance in public improvements and the difficulty usually experienced in the Western Hemisphere of properly governing municipalities, mitigated in the United States by a limit of indebtedness to a small percentage on the total property values—a limit difficult of application to South America, where there is no direct taxation on property values.

We shall be called on to replace Europe in taking the governmental, state and municipal bonds formerly absorbed by it, although not on as vast a scale as they were offered in the past decade of almost universal extravagance—governmental, state and municipal—as well as corporate and individual. The present long crisis, beginning with the Balkan War, in the autumn of 1912, has brought a salutary change in the scale of expenditure, private and governmental, resulting in balances of trade, increasing in Argentina from \$59,777,000 in 1913 to \$255,000,000 in 1915, and in Brazil from minus \$11,279,000 in 1913 to plus \$108,000,000 in 1915, while governmental expenditure in Argentina decreased from \$187,000,000 in 1913 to \$165,000,000 in 1915, and in Brazil from \$224,706,000 in 1913 to \$145,000,000 in 1915. But as governmental incomes are mainly based on import dues, they have suffered to such an extent that even with the economy effected most governments still show deficits, which, however, should pass away with the next year as far as concerns the more important governments. We have an example before our eyes in our own country of the effect on government revenues of the reduction in imports caused by the war.

When the South American governments shall have balanced their budgets under present conditions, the situation of these countries will be unusually sound and

healthy, as the latter are being strengthened by their large and increasingly favorable annual balances of trade and their business adjusted to less use of credit, while the outstanding commercial and industrial indebtedness is largely liquidated. State and municipal loans, however, must be scrutinized with especial care and each case judged on its own merits, differing in this respect from the situation in the United States regarding such securities.

STATUS OF RAILROAD BONDS

Railroads in Latin-America have the inestimable advantage of concession contracts with the governments defining the respective rights and obligations. In the United States, railroads were built under general State laws without contracts, and, as a consequence, the Government has a power of interference in all matters, including rates, limited only by what the courts may consider to be a reasonable return on the investment of the most favored railroads, condemning those less favored to a lower return or none at all.

In Brazil, for instance, in those cases in which the concession contracts give the government the right to reduce rates after the net earnings amount to a certain percentage on the capital invested, this is fixed at 12 per cent on the recognized capital invested, including that supplied through sale of bonds, shares and operating earnings left in the property, so that it is not onerous. The history of the last ten years in the United States of the declining value of railroad investments, while there has been a huge expansion in values and returns of almost all other property and business, is indicative of the disadvantage of railroads here in not having contracts defining their rights and their obligations, and the protection given to railroads in South America by having their enterprises based upon such definite contracts.

Street railroads, electric light, gas, and hydroelectric enterprises can be judged in South America as in the United States, except that, where a large, cheaply developed water-power exists, the percentage of economy in the cost of power, on account of the high price of good coal, lacking up to the present in South America, is greater than in the United States. Brazil, owing to its rainfall and configuration, has perhaps the greatest amount of water-power of any country in the world, especially in the most southerly and central portions of the country.

PRODUCTS CONSUMED IN THE UNITED STATES

Iron Ore

Brazil has the largest known deposits in the world of 70 per cent iron ore, practically free from phosphorus. The State of Minas Geraes alone is estimated to have 1,500,000,000 to 2,000,000,000 tons at about 300 to 400 miles from the sea coast, and bodies of iron ore exist in other states of Brazil. Our Eastern mills, whose expansion should take on a new phase with our increasing export of steel and steel products, can use this ore to advantage as well as Europe, where it will allow low-grade and high-phosphorus ores to be used by mixture.

Brazil, now the largest producer of manganese ores after India, sends almost her entire output to the United States, which is planning to increase greatly the consumption to replace shipments from India interfered with by the war.

Nitrates

The largest deposits of nitrate of soda in the world are in Chile—in fact, the only known large deposits.

*From a paper read at the New Orleans Convention of the National Foreign Trade Council, Jan. 27, 1916.

The volume of consumption in time of peace is much increased in time of war by its use for ammunition; the demand of the Allies alone making up in tonnage for the loss of the German market, which before the war took 70 per cent of the output of the Chilean nitrate fields. The United States must be certain of its supply of ammunition in case of war, running into hundreds of thousands of tons per year, and it would be necessary for us to establish great water-power and other electric factories to make artificial nitrates from the air at a larger permanent cost of the product than the Chilean nitrates were the trade route to Chile (including the Panama Canal) not certain to be kept open for us, making it an available source of supply.

Some of the nitrate fields should be owned by Americans, so as not to leave the control of the product entirely in European hands, as we have recent examples of the derangement of our commerce and industries by the product of European companies being taken over or controlled by governments as war measures, as in the case of burlap from India, rubber from Ceylon and the Straits Settlements, and tin from the Straits Settlements.

In time of peace, as well as in time of war, our country is becoming an increasing consumer of nitrates for agricultural purposes and is likely to be one of the world's largest consumers. On the poor soil of the Eastern States, or the partly worn-out soil of the Central States of the United States, the effect of their use is magical in the output per acre. It might be that our banking system would find a way to make advances to farmers for nitrate for their lands, to be repaid out of the greatly increased season's crop, as has been the custom of the banks in another country, lessening its dependence on imports for food products through the greatly increased agricultural yield of her lands.

While we had large unoccupied areas of rich land there was no necessity to tone up the production of the lands already cultivated, but now that we no longer have fertile lands unoccupied we must turn to nitrates to multiply the production of the land of our most settled sections, which are also those most needing nitrates.

Tin, Copper and Silver Ores

We are suffering from governmental interference, as a war measure, with the largest supply of tin, that of the Straits Settlements, already greatly embarrassed through the present inadequate transportation and high freight rates and likely to become more so with the closing of the Suez Canal to traffic. Is it not clearly to the interest of the United States to use, as the source of its tin, Bolivia, containing rich tin ores capable of supplying the world and now producing 18 per cent of the world's output? There are no tin smelters except in Europe, but the first ones in the United States are just building. American investment in tin mines would suggest itself.

Copper and silver ores, found in large deposits in Chile, Bolivia and Peru, are already worked by American interests and are capable of much greater development.

The plateau of Bolivia, one of the most highly mineralized countries of the world, offers an attractive field to American prospectors, especially to those forced out of Mexico by the revolutionary conditions.

Rubber

The great present source of the world's supply of rubber, the Orient, estimated this year to yield 125,000 tons against 40,000 tons from Brazil, is deranged by the high cost of transportation, on account of the war, so that the situation as regards both price and deliveries is no longer a natural one.

Now that the Amazon valley has adapted itself to the prices of the Oriental products and has liquidated its artificial situation growing out of the previous high price of rubber, which was one of extravagance, waste, and uneconomical methods, and has a better supply of labor at lower prices, partly through the numbers of Brazilians coming in from Ceará and Rio Grande do Norte, American investment might turn to the large

tracts of rubber-bearing land along the navigable rivers of the Amazon valley and expand their output by greater development. At present rubber is only gathered from within two to three miles of the river banks, the hinterland being untouched, so that the production can be increased indefinitely. The Amazon valley can be made a certain source of supply of the best quality of rubber for all our present and future needs for an indefinite period, within a short sea trip from the United States on a route it must protect in any case.

Extract of quebracho, the principal source of tannin for leather, comes from a tree of that name found only in the Argentine and Paraguay Chacos west of the Paraguay River. A European company has almost a monopoly of the present output of quebracho extract, the price of which has more than doubled since the outbreak of the war, and latterly the control of this product has been taken over by a European government. As the greatest leather-manufacturing country in the world, is it not wise to assure ourselves a source of supply not subject to interference?

CATTLE RAISING

The breeding lands of the world elsewhere than in Latin-America have so narrowed through the encroachments of agriculture that the world's consumption of meat, constantly increasing, has much passed supplies from those sources. The reserves of wheat production—Canada, Siberia—are too cold for cattle breeding, and the unoccupied ranges of Australia and South Africa receive too little rainfall to make them good cattle ranches, so that they are likely to be called on for further production on a large scale only after South America's well-watered pastures are filled. No larger extent of such pastures, with climate suitable for cattle, has ever existed than this immense region of southern Brazil, eastern Bolivia, Paraguay and northern Argentina, which now is the only large unoccupied region eminently adapted for cattle breeding, Argentina and Uruguay being well occupied with cattle ranches, excepting northern Argentina, so the development of cattle breeding and the substitution of ranches taken for agricultural purposes must fall for the greater part on the area mentioned.

There are many American cattle breeders with some money who have had to go out of the cattle business through the rise in the price of their land and encroachments of agriculture, to whom the pastures of South America offer a profitable field for investment and for their activities. American packing houses already established and about to be erected in these countries assure to their cattle the world's market—practically unlimited.

Packing houses have already been established by American interests at Buenos Aires, La Plata, Montevideo, Sao Paulo (Brazil), and are in contemplation at other places. Enlargement of the packing houses already existent and the construction of others are required to handle the cattle produced by South America for the world's market, of which the United States has become a part as an increasingly meat-importing nation.

There is no other place in the world than South America which can give us the largely increased supplies of meat required, and the fact that our communications must be protected in any case is an important element in dealing with such a necessity as meat is at all times and in time of war even more than in time of peace.

LACK OF AMERICAN SHIPPING

Keeping the trade routes open, under all conditions, on both the east and west coasts of South America, including the Panama Canal, which is a condition sine quâ non of the maintenance of the Monroe Doctrine, gives assurance that the trade of shipping lines owned by the American republics will not be disturbed in time of war, but it does not supply the present lack of shipping. Outside of the handicap of our own governmental regulations, an insuperable obstacle in the past to the establishment of American shipping lines has been the lack of sufficient tonnage of return cargo to the United States, as we ourselves have been exporters and not importers of the wheat, corn, and, until lately, of the

meat products, while coffee and rubber gave a relatively small tonnage.

This situation will be entirely changed by bringing to the United States Brazilian iron ore, manganese, meat products, as well as rubber, coffee and cocoa; Argentine meat products, wool, flax, quebracho and extract of quebracho; Chilean nitrates and copper concentrates, and Bolivian concentrated tin ores for smelting in the United States, as these will furnish such a huge tonnage moving this way as to require to counterbalance it not only the expected large increase of our exports to South America of general merchandise but also a heavy tonnage of American coal.

It may not be generally understood that it is the heavy tonnage of British coal exported, 97,719,000 tons in 1913, about three-fifths of the tonnage of Britain's total exports, carried at times suiting the convenience of her steamship lines and affording them at the same time a sure and cheap supply of their own fuel, which has been a determining factor in her preponderance in the ocean-carrying trade. The entry of America on a large scale into the coal trade of South America will likewise be one of the main factors in the building up of a great American mercantile marine, and until we have built up such a marine all calculations regarding our raw materials and other supplies from abroad, as well as regarding our exports, are subject to derangement at any time by happenings over which we have no control, as at present.

EUROPE'S SOUTH AMERICAN SECURITIES

The mobilization of American securities by the British Government may furnish \$1,250,000,000 to \$1,500,000,000 of exchange, postponing for about nine months the necessity of finding further means of providing her with exchange to cover the balance of trade for munitions and supplies and to her Allies. As long as the Dardanelles are closed, the latter must continue to be heavy, as Russia is unable to export to advantage her grain and other products, so that her enormous requirements for munitions imported create a heavy adverse balance of trade which she can only meet through England's financial support. Therefore, if the war goes on, and it looks as if it would, a further solution will be required for the exchange situation next autumn.

This can only come about through the sale to the United States, the only possible purchaser, of some other properties which we might care to purchase, pointing naturally to some of Europe's holdings of South American securities, of which England alone is estimated to own upwards of \$3,000,000,000. In helping Europe to meet her needs in this way, we shall at the same time give ourselves the most favorable form of investment to be made in South America in taking proved properties, eliminating the risk and delay usually attendant upon investments in new fields. Europe must realize that it is to its advantage for us to prepare now for this situation, as otherwise when the crisis arises requiring immediate action our bankers and public might not be prepared with the necessary information on which to act. This must not be regarded in the light of profiting by the misfortunes of Europe, but of helping her to the solution of one of her most pressing problems—how to finance foreign supplies, in which we, as the principal supplier, are equally interested.

CONDITIONS AFTER THE WAR

The war, however much the temporary prosperity brought to the United States may blind us, must in the long run be a misfortune to us also, though naturally less so. When the war is over it is likely to find us with inflated prices and wage scales out of relation to the rest of the world, with habits of extravagance and looseness and with Europe's purchases from us stopped short owing to poverty and the need to protect her own exchange situation, while for the same reasons she will be impelled to capture all possible of South American and other markets, including our own home markets. What will be the situation of our industries under these conditions? Are we not likely to suffer the greatest industrial shock of our history, and is not our own inflated condition, especially relatively, likely

to result in a rapid return to Europe of a part of her wealth now flowing to us?

The situation can be met only by the rigorous adoption of national habits of discipline and co-ordination, so that our national effectiveness may represent as nearly as possible the sum total of our individual and corporate energies instead of, as now, being diminished by the lost motion necessarily resulting from their absence. It will take a long time to bring about a change, as we seem now to pride ourselves especially on our excessive individualism, resenting the restraints of discipline and co-ordination, which we do not admire nor desire, so that it looks as if, to change radically in this regard, and a radical change is necessary, we shall have to be "taken young" before our ideas are formed. The Swiss system of military training applied universally in our schools and colleges may be the only practical way of accomplishing this, and the habits of discipline and co-ordinated effort given to the rising generation would bring results of incalculable importance to our future commercial and industrial life, as well as solve one of the fundamentals of military preparedness at small cost of time and money.

American-Russian Chamber of Commerce

E. C. Porter, who for two years has been the commercial agent in charge of the New York office of the Bureau of Foreign and Domestic Commerce, resigned his office March 3 to become the executive secretary of the recently formed American-Russian Chamber of Commerce, 60 Broadway, New York. The American-Russian Chamber of Commerce, which is closely associated with the Russian-American Chamber of Commerce in Moscow, has been founded to create the direct medium by which the business interests of both Russia and the United States can be brought into closer union and to develop the trade relations between the two countries.

The first board of directors of the American-Russian Chamber of Commerce includes Samuel McRoberts, first vice-president of the National City Bank; Charles H. Sabin, president Guaranty Trust Company; Darwin P. Kingsley, president New York Life Insurance Company; A. Barton Hepburn, chairman board of directors of the Chase National Bank; George McFadden, cotton exporter of Philadelphia; Daniel G. Wing, president First National Bank of Boston; James Parmelee, president National Carbon Company, Cleveland, Ohio; William J. Chalmers, manufacturer, Chicago; Frederic W. Allen, Lee, Higginson & Co.; Charles Hayden, Stone & Co.; Charles S. Sargent, Jr., Kidder, Peabody & Co.; and Hayden B. Harris of Harris, Forbes & Co.

The membership includes the American International Corporation, American Hide & Leather Company, the Allied Machinery Company of America, Baldwin Locomotive Works, Consolidation Coal Company, DuPont de Nemours Powder Company, Rice & Hutchins, shoe manufacturers, Boston; Remington Arms-Union Metallic Cartridge Company, Midvale Steel Company, Pressed Steel Car Company, Simmons Hardware Company, Barrett Company, Berlin Mills Company, Portland, Me.; L. E. Waterman Company, J. G. White Engineering Company, American Trading Company and others.

The Cleveland office of the General Electric Company has recently taken a number of large orders, among them being the following: A 1000-kw. direct current geared turbine for the Lakeside works, Otis Steel Company, to furnish power for cranes and other foundry equipment; three centrifugal turbine-driven exhausters and two geared boosters, one motor driven and the other turbine driven, for the new blast furnace of Corrigan, McKinney & Co., Cleveland; four variable speed motors, one 600 hp., one 400 hp., one 200 hp. and one 150 hp., and two motor-generator sets, one 750 and one 300 kw., for the Cuyahoga works of the American Steel & Wire Company; a centrifugal air compressor for A. G. McKee & Co., Cleveland, to be installed at the plant of the Pulaski Iron Company, Pulaski, Va., and a controlling switchboard for the United Furnace Company, Canton, Ohio.

January Iron, Steel and Machinery Exports

Great Movement of Past Months Well Sustained—Machinery Falls Below the Record Reached in November, 1915

WASHINGTON, D. C., March 7, 1916.—The export movement of iron, steel and machinery was well sustained in January, 1916, although the totals of both classes fell slightly below the figures for certain months in the latter half of 1915, according to figures just compiled by the Bureau of Foreign and Domestic Commerce. Exports of tonnage commodities in January exceeded by 155 per cent the shipments in the same month of 1915 but, for reasons heretofore explained, which have been reflected in the statistics for several months, fell short of the high totals of July, August, September and November, 1915. Shipments of machinery in January surpassed those for the same month of 1915 by 85 per cent but failed by a narrow margin of reaching the record figures of October and November, 1915.

For the seven months ended Jan. 31, 1916, the exports of tonnage commodities showed an increase of more than 200 per cent as compared with the same period of 1915 and of 100 per cent as compared with the record total for the like period of 1914. Exports of machinery for the seven months of 1915 gained 105 per cent over 1914 and 25 per cent over the high water mark of 1913. In considering these comparisons, the fact should be borne in mind that the seven months ended January, 1915, included the first six months of the war during which our foreign commerce suffered serious interruption. It will be noted, however, that, basing comparisons on the unprecedented totals of machinery exports for the seven months of 1913 and of tonnage commodities for 1914, the 1916 figures show very substantial gains.

Details of the exports of machinery for January, 1915, and 1916, and for the two seven months' periods are as follows:

The following table shows the exports of tonnage iron and steel in January and for the seven months ended January as compared with 1915:

	Exports of Iron and Steel			
	January		Seven Months	
	1915	1916	1915	1916
Pig iron	Gross Tons	Gross Tons	Gross Tons	Gross Tons
Pig iron	8,862	18,719	52,275	156,022
Scrap	1,327	16,681	10,610	75,495
Bar iron	391	5,997	3,409	36,398
Wire rods	8,235	8,105	31,611	98,054
Steel bars	17,933	58,402	81,359	292,132
Billets, ingots and blooms, n.e.s.	16,046	55,315	39,598	419,500
Bolts and nuts	985	2,336	7,268	18,710
Hoops and bands	1,020	3,399	6,046	22,654
Horseshoes	416	786	5,702	8,917
Cut nails	217	229	1,163	2,748
Railroad spikes	214	1,792	3,171	12,464
Wire nails	5,838	10,999	26,176	67,541
All other nails, including tacks	197	525	1,987	6,309
Cast-iron pipes and fittings	3,907	6,136	42,345	29,127
Wrought pipes and fittings	6,905	8,704	63,622	77,685
Radiators and cast-iron house heating boilers	128	149	1,863	1,503
Steel rails	8,864	38,122	73,859	334,909
Galvanized iron sheets and plates	3,343	5,120	22,138	44,898
All other iron sheets and plates	667	3,364	3,694	22,412
Steel plates	9,078	23,742	56,433	169,786
Steel sheets	8,338	7,428	56,112	56,600
Structural iron and steel	10,833	19,482	89,300	289,414
Tin and terne plates	7,014	12,178	40,015	119,729
Barb wire	9,530	35,962	68,529	193,017
All other wire	9,501	15,449	56,350	141,200
Total	139,789	357,121	844,635	2,697,224

MACHINERY EXPORTS

The exports of machinery in January, 1916, were

	Exports of Machinery Compared by Periods		Seven Months	
	January	1915	1915	1916
Adding machines	\$17,393	\$83,996	\$266,104	\$439,155
Air-compressing machinery	30,240	26,677	193,147	306,697
Brewers' machinery	1,834	1,370	84,411	19,605
Cash registers	142,781	85,515	886,712	732,603
Parts of	3,747	14,907	72,020	68,518
Cotton gins	5,409	7,582	26,559	38,565
Cream separators	15,603	62,983	104,565	269,748
Elevators and elevator machinery	73,033	84,225	504,482	785,799
Electric locomotives	14,168	151,245	204,408	245,486
Gas engines, stationary	155,938	95,540	289,391	263,802
Gasoline engines	384,236	751,404	1,963,912	4,423,507
Steam engines	368,828	2,248,231	1,519,463	11,151,462
All other engines	30,996	273,970	324,896	828,430
Parts of	197,813	644,533	1,434,657	3,714,109
Laundry machinery, power	25,429	12,619	141,358	155,443
All other	21,268	19,017	125,439	168,674
Lawn mowers	46,252	24,820	125,240	94,467
Metal-working machinery (including metal-working tools)	2,903,740	3,249,595	10,976,251	25,196,917
Meters, gas and water	21,196	28,809	186,324	140,482
Milling machinery (flour and grist)	53,799	197,351	464,184	1,584,442
Mining machinery, oil-well	139,943	92,804	1,374,008	657,531
All other	231,153	394,396	2,284,902	3,767,605
Paper-mill machinery	51,890	56,649	366,652	573,419
Printing presses	62,489	161,780	767,894	871,152
Pumps and pumping machinery	174,212	359,587	1,410,199	2,519,361
Refrigerating and ice-making machinery	42,701	51,883	255,424	430,484
Sewing machines	412,932	495,157	3,525,627	3,092,705
Shoe machinery	127,787	73,413	624,512	822,388
Sugar-mill machinery	69,602	420,240	1,280,498	4,902,091
Textile machinery	143,959	172,679	830,878	1,216,874
Type-setting machines	55,350	49,328	517,616	325,808
Typewriting machines	457,025	706,347	2,465,617	4,654,166
Windmills	47,973	66,455	396,365	554,272
Wood-working machinery, sawmill	13,742	23,689	138,742	171,288
All other	42,118	60,947	351,093	706,630
All other machinery, and parts of	1,089,499	3,022,800	8,509,623	16,625,014
Total	\$7,676,078	\$14,324,426	\$44,993,573	\$92,518,708

EXPORTS OF IRON AND STEEL

The exports of iron and steel for which quantities are given aggregated 357,121 gross tons in January, 1916, as compared with 139,789 tons in January, 1915, and 118,772 tons in 1914. The total for the seven months ended January was 2,697,224 gross tons as compared with 844,635 tons in 1915 and 1,357,092 in 1914.

valued at \$14,324,426 as compared with \$7,676,078 for the same month of 1915 and \$8,122,529 in January, 1914. Shipments of metal-working machinery, which reached a record total in November last, showed a decline as compared with that month but surpassed the total of December, 1915, and exceeded materially the shipments of January, 1915. In this connection the following table, showing the total exports of machinery

and the shipments of machine tools by months during the record-breaking year of 1915, will be of interest:

Exports of Machinery in 1915, by Months

1915	Total Machinery	Machine Tools
January	\$7,676,078	\$2,903,740
February	7,936,467	2,523,722
March	10,053,895	3,863,913
April	10,399,716	3,300,953
May	10,214,062	3,762,567
June	10,266,981	3,735,562
July	11,412,623	3,872,358
August	11,439,391	3,624,411
September	12,277,389	3,256,973
October	15,239,415	3,236,079
November	15,838,119	4,644,713
December	13,328,450	3,205,788
Total	\$134,128,862	\$42,037,779

Delay in the receipt of figures from certain ports makes it impossible to present in this connection the statistics of imports of iron and steel in January.

W. L. C.

SIX MORE ACTIVE FURNACES

Pig-Iron Gains Made With Difficulty

Active Capacity on March 1 Was 107,510 Tons a Day for 312 Stacks

The increase in pig-iron production which was interrupted in January by the Youngstown strike was resumed last month, but it is evident that further additions to active capacity will now be made with difficulty. Production in the 29 days of February was 3,087,212 tons, or 106,456 tons a day, against 3,185,121 tons in January, or 102,746 tons a day. There was a net gain of six furnaces in the number in blast, and on March 1 the capacity of the 312 active furnaces was 107,510 tons a day, against 106,372 tons a day for 306 furnaces on Feb. 1.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from February, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons		
	Steel works	Merchant
February, 1915	44,192	15,621
March	50,036	16,539
April	52,804	17,746
May	54,655	18,360
June	59,022	20,339
July	62,395	19,796
August	67,801	21,865
September	70,977	24,108
October	73,595	27,227
November	73,282	27,962
December	73,647	29,686
January, 1916	72,614	30,132
February	75,305	31,151

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in February and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)	Feb. (29 days)
New York	186,758	193,818	196,448	191,648
New Jersey	6,022	5,169	4,471	0
Lehigh Valley	113,904	108,862	111,744	104,207
Schuylkill Valley	79,590	92,391	89,151	90,507
Lower Susquehanna and Lebanon Valley	54,557	60,755	66,651	61,362
Pittsburgh district	730,515	750,186	763,127	717,928
Shenango Valley	171,635	190,807	184,031	185,161
Western Pennsylvania	172,290	177,002	175,717	170,597
Maryland, Virginia and Kentucky	74,816	86,448	89,513	85,056
Wheeling district	114,798	117,202	113,989	110,105
Mahoning Valley	304,421	320,196	271,306	310,742
Central and Northern Ohio	246,826	254,542	263,090	240,271
Hocking Valley and Hanging Rock	41,548	39,310	50,774	45,850
Chicago district	433,184	459,524	455,545	428,257
Mich., Minn., Mo., Wis. and Col.	81,493	97,087	97,120	95,806
Alabama	211,127	228,697	229,584	226,688
Tennessee	13,774	21,296	22,860	23,027
Total	3,037,308	3,203,322	3,185,121	3,087,212

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel

companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production			Spiegeleisen and ferromanganese	
	1914	1915	1916	1914	1915
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319
Mar.	1,704,688	1,551,082	2,013,327	20,133	12,274
Apr.	1,635,226	1,584,111	1,676	12,337	...
May	1,457,847	1,694,290	21,504	13,440	...
June	1,329,623	1,770,657	16,254	19,200	...
July	1,395,851	1,949,750	16,524	17,854	...
Aug.	1,455,054	2,101,818	11,577	27,463	...
Sept.	1,390,322	2,129,322	13,786	23,159	...
Oct.	1,271,820	2,281,456	17,435	23,992	...
Nov.	1,059,159	2,198,459	21,977	28,741	...
Dec.	1,034,802	2,283,047	20,733	25,004	...

CAPACITY IN BLAST MARCH 1 TO FEBRUARY 1

The following table shows the daily capacity in gross tons of furnaces in blast March 1 and Feb. 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Mar. 1		Feb. 1	
		Number in blast	Capacity per day	Number in blast	Capacity per day
<i>New York:</i>					
Buffalo	19	17	6,018	17	6,100
Other New York	5	3	589	3	637
New Jersey	6	0	0	0	0
<i>Pennsylvania:</i>					
Lehigh Valley	20	14	3,440	13	3,385
Spiegel	2	2	218	2	223
Schuylkill Val.	12	11	3,265	10	2,912
Lower Susquehanna	6	5	1,318	5	1,333
Lebanon Val.	9	5	797	5	776
Pittsburgh Dist.	53	52	24,721	51	24,656
Ferro	3	3	350	3	355
Shenango Val.	19	19	6,420	19	6,484
Western Pa.	22	17	5,714	17	5,571
Ferro	4	3	168	3	235
Maryland	4	4	1,580	3	1,251
Wheeling District	13	10	3,796	10	3,677
<i>Ohio:</i>					
Mahoning Val.	25	25	10,885	24	10,540
Central and Northern	23	21	8,285	22	8,687
Hocking Val. & Hang'g Rock	15	11	1,629	11	1,656
Illinois and Ind.	35	31	14,836	31	14,695
Ferro	1	1	86	0	0
Michigan, Wis. & Minn.	12	9	2,464	9	2,428
Col. and Mo.	7	3	1,039	2	757
<i>The South:</i>					
Virginia	18	9	1,182	9	1,172
Kentucky	5	3	495	3	499
Alabama	38	26	7,420	25	7,538
Ferro	1	0	0	1	70
Tennessee	14	8	795	8	735
Total	389	312	107,510	306	106,372

Furnaces blown in in February included one Hoken-dauqua in the Lehigh Valley, one Worth in the Schuylkill Valley, one Edgar Thomson in the Pittsburgh district, one Sparrows Point in Maryland, Niles in the Mahoning Valley, one Iroquois and one South Chicago in the Chicago district, one Minnequa in Colorado, one Minnesota Steel at Duluth and one Clifton in Alabama. Among furnaces blown out in the month were one Lorain in northern Ohio, one Gary in the Chicago district, one Zug Island at Detroit and one Ensley in Alabama.

THE RECORD OF PRODUCTION

	Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons				
	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,763,563	2,347,867	2,063,834	...
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	...
May	2,512,582	2,822,217	2,092,686	2,263,470	...
June	2,440,745	2,628,565	1,917,783	2,350,827	...
July	2,410,889	2,560,646	1,957,645	2,563,420	...
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	...
Sept.	2,463,839	2,505,927	1,882,577	2,852,561	...
Oct.	2,659,933	2,546,261	1,778,186	3,125,491	...
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	...
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	...
Total, yr.	29,383,490	30,724,101	23,049,752	29,662,566	...

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on

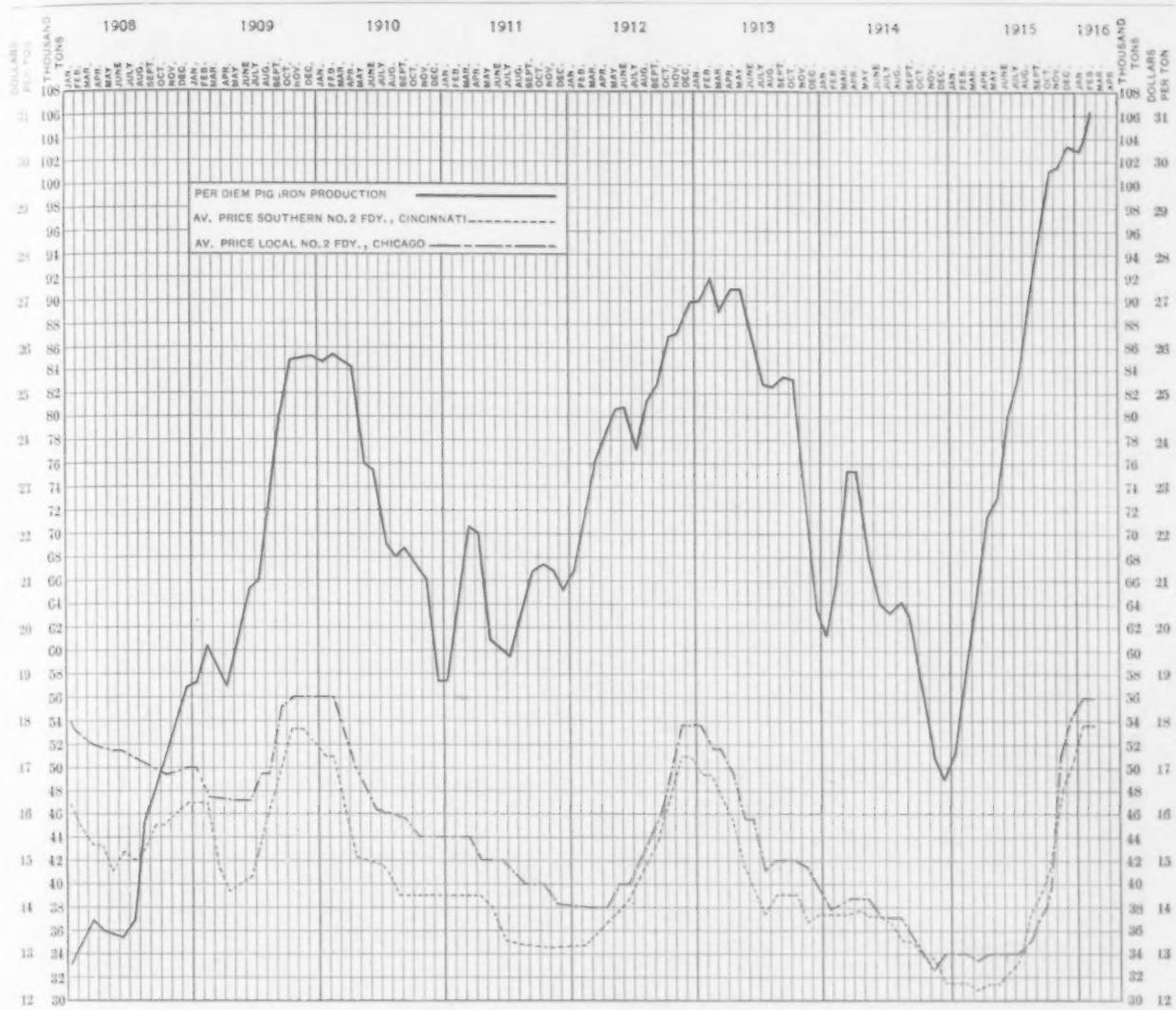


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to March 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE. The figures for daily average production, beginning January, 1909, are as follows:

*Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—
Gross Tons*

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	59,232	84,458	70,036	77,591	89,147	75,738	66,375	.....
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	.....
May	60,753	77,102	61,079	81,051	91,039	67,506	73,015	.....
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	.....
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	.....
Aug.	72,546	67,963	62,150	81,046	82,057	64,363	89,666	.....
Sept.	79,507	68,478	65,903	82,128	83,531	62,753	95,085	.....
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	.....
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	.....
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	.....

Blast Furnace Notes

Every furnace in the Pittsburgh district was in blast March 1 except one Edgar Thomson.

The Virginia Iron, Coal & Coke Company will blow in its furnace at Middlesboro, Ky., by March 17.

The Roane Iron Company, Chattanooga, Tenn., is preparing to blow in a second furnace at Rockwood, Tenn., which will give it a daily capacity of 400 tons.

The Pennsylvania Steel Company has begun to overhaul its Lochiel blast furnace at Harrisburg, Pa., which has been idle for many years. The stack will be held in reserve and blown in only should it be necessary to keep up the present ingot capacity at the Steelton plant. Work on the No. 3 furnace at Steelton, which is

being rebuilt to increase its capacity, is progressing. The foundations have been completed.

Canadian Pig Iron and Steel in 1915

Canada's pig-iron production in 1915, according to a preliminary report by John McLeish, chief of the Division of Mineral Resources and Statistics of Canada, was 815,820 gross tons, valued at approximately \$11,592,819, compared with a production of 699,253 tons in 1914 or an increase of about 17 per cent. Of the 1915 output, 803,595 tons was made with coke and 12,225 tons with charcoal. Included in the ore charged into blast furnaces 261,879 tons came from Canadian mines and 1,306,580 tons was imported, of which approximately 750,525 tons was Newfoundland ore.

The production of steel ingots and castings in Canada in 1915 was 911,013 gross tons, including 5023 tons from electric furnaces, against 739,857 tons for 1914.

Canada's iron-ore shipments last year were 355,457 gross tons, valued at \$774,427, against 208,610 tons in 1914. Iron-ore shipments from the Wabana mines, Newfoundland, were 775,402 tons in 1915, of which 716,185 tons went to Cape Breton and 59,217 tons to England. In 1914 the total was 570,928 tons, of which 377,607 tons went to Cape Breton and 193,321 tons to the United States and Europe. None came to this country in 1915.

The mining of chrome ore in 1915 resulted in an output of 10,255 gross tons, valued at \$162,618. From 1910 to 1914 none of this ore was mined. Magnesite also had an increased production amounting to 13,195 gross tons last year, against an average output from 1908 to 1914 inclusive of only 554 tons.

PRODUCTION OF PIG IRON IN THE UNITED STATES IN 1915.

HALF-YEARLY PRODUCTION OF ALL KINDS OF PIG IRON, 1915.

States.	Blast furnaces.			Production—Gross tons. (Includes spiegeleisen, ferro-mang., ferro-silicon, ferro-phosphorus, etc.)		
	In blast June 30, 1915.	Dec. 31, 1915.		First half of 1915.	Second half of 1915.	Total, 1915.
		In.	Out.			
Massachusetts	0	0	2	2	3,087	4,715
Connecticut	1	1	2	3		7,802
New York	16	18	9	27	921,566	1,183,214
New Jersey	1	1	4	5		2,104,780
Pennsylvania	96	125	31	156	5,199,421	7,591,247
Maryland	2	3	2	5	85,673	165,875
Virginia	5	7	15	22	105,244	146,102
Georgia	0	0	4	4		251,346
Texas	0	0	2	2		.....
Alabama	20	27	20	47	868,341	1,181,112
West Virginia	1	3	1	4	70,228	211,812
Kentucky	1	3	3	6		291,040
Mississippi	0	0	1	1		.....
Tennessee	5	6	12	18	82,992	94,737
Ohio	50	62	12	74	2,964,211	3,948,751
Illinois	12	21	5	26	801,951	1,645,269
Indiana	10	10	0	10	854,375	1,132,403
Michigan	8	11	3	14		1,980,778
Wisconsin	4	7	1	8	130,514	242,452
Minnesota	1	2	0	2		372,966
Missouri	1	1	1	2		.....
Colorado	2	2	4	6	137,188	134,733
Oregon	0	0	1	1		271,921
California	0	0	0	0		.....
Total	236	310	135	445	12,233,791	17,682,422
						29,916,213

HALF-YEARLY PRODUCTION OF COKE PIG IRON.

New York	16	18	5	23	Production—Gross tons.		
					First half of 1915.	Second half of 1915.	Total, 1915.
New Jersey	1	1	4	5	921,566	1,183,214	2,104,780
Pennsylvania	91	118	21	139	5,155,120	7,547,217	12,702,337
Maryland	2	3	1	4	85,578	165,566	251,144
Virginia	5	7	13	20			.....
Georgia	0	0	2	2	105,244	146,102	251,346
Texas	0	0	1	1			.....
Alabama	18	26	17	43	853,445	1,169,054	2,022,499
West Virginia	1	3	1	4	79,228	211,812	291,040
Kentucky	1	3	2	5			.....
Tennessee	5	6	11	17	82,992	94,737	177,729
Ohio	49	62	11	73	2,964,007	3,948,089	6,912,096
Illinois	12	21	5	26	801,951	1,645,269	2,447,220
Indiana	10	10	0	10			.....
Michigan	2	2	1	3	851,084	1,182,146	2,033,230
Wisconsin	3	5	1	6			.....
Minnesota	1	2	0	2			.....
Missouri	0	0	1	1			.....
Colorado	2	2	4	6	161,593	180,294	341,887
Total	219	289	101	300	12,061,808	17,473,500	29,535,308

ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

New York	0	0	3	3	Production—Gross tons.		
					First half of 1915.	Second half of 1915.	Total, 1915.
Pennsylvania	2	4	8	12	42,487	42,266	84,753
Total	2	4	11	15	42,487	42,266	84,753

HALF-YEARLY PRODUCTION OF CHARCOAL PIG IRON.

Massachusetts	0	0	2	2	Production—Gross tons.		
					First half of 1915.	Second half of 1915.	Total, 1915.
Connecticut	1	1	2	3	3,087	4,715	7,802
New York	0	0	1	1			.....
New Jersey	0	0	0	0	1,814	1,764	3,578
Pennsylvania	3	3	2	5			.....
Maryland	0	0	1	1	95	309	404
Virginia	0	0	2	2			.....
Alabama	2	1	3	4	14,896	12,058	26,954
Georgia	0	0	2	2			.....
Texas	0	0	1	1	204	662	866
Kentucky	0	0	1	1			.....
Tennessee	0	0	1	1			.....
Mississippi	0	0	1	1			.....
Ohio	1	0	1	1			.....
Michigan	6	9	2	11	98,856	118,946	217,802
Wisconsin	1	2	0	2			.....
Missouri	1	1	0	1	10,544	28,202	38,746
Oregon	0	0	1	1			.....
California	0	0	0	0			.....
Total	15	17	23	40	129,496	166,656	296,152

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke	219	259	101	390	Production—Gross tons.		
					First half of 1915.	Second half of 1915.	Total, 1915.
Anthracite*	2	4	11	15	42,487	42,266	84,753
Charcoal	15	17	23	40	129,496	166,656	296,152
Total	236	310	135	445	12,233,791	17,682,422	29,916,213

* Includes mixed anthracite and coke pig iron.

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS, 1915

States.	For sale.	For maker's use.	Total. Gross tons.	Production—Gross tons.		
				First half of 1915.	Second half of 1915.	Total, 1915.
Massachusetts, Connecticut	6,952	850	7,802			.....
New York, New Jersey, Maryland	1,274,363	1,081,965	2,356,328			.....
Pennsylvania	2,279,747	10,510,921	12,790,668			.....
Virginia, West Virginia, Alabama	1,656,148	828,342	2,484,490			.....
Kentucky, Tennessee	284,990	88	285,078			.....
Ohio	1,775,186	5,137,776	6,912,962			.....
Indiana, Illinois	463,621	3,512,590	3,976,211			.....
Mich., Wis., Illino., Mo., Col., Cal.	842,000	260,674	1,102,674			.....
Total	Gross tons	8,583,007	21,333,206	29,916,213		

PRODUCTION OF PIG IRON BY GRADES.

HALF-YEARLY PRODUCTION OF BASIC PIG IRON.

States.	First half of 1915.	Second half of 1915.	Total for 1915.
New York, New Jersey	248,725	507,864	756,589
Pennsylvania—Allegheny County	1,468,844	2,111,503	3,580,347
" Other counties	1,421,826	2,133,191	3,555,017
Virginia, Alabama, Kentucky	315,133	467,879	783,012
Ohio	841,226	1,057,677	1,898,903
Indiana, Illinois	809,006	1,418,439	2,227,444
Michigan, Minn., Missouri, Colorado	154,855	137,047	291,902
Total	5,259,614	7,833,600	13,093,214

HALF-YEARLY PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS.

New York	Pennsylvania	Maryland	Virginia, West Virginia, Kentucky	Tennessee	Alabama	Ohio	Illinois, Michigan, Wisconsin	Michigan	Wisconsin	Minnesota, Missouri, Colorado	Total	
New York	170,149	187,635	357,784									
Pennsylvania	1,749,755	2,598,342	4,348,097									
Maryland	73,449	151,930	225,379									
Virginia	2,673	9,138	11,811									
West Virginia, Kentucky, Tenn., Ala.	70,214	194,378	264,592									
Ohio	1,661,516	2,218,										

LIABILITY FOR BAD CASTINGS

Who Pays for Machine Work Done and Material Wasted Before Rejection?

The purchasing agent of a leading railroad recently raised the question as to how far a foundry can be held liable in the case of a defective casting where the defect is not discovered until considerable work has been done on the piece, and material destroyed. He cited a case where gray iron castings not only proved defective in the process of machining, thus causing a loss in labor and in the time of machines, but also necessitated the scrapping of a number of brass bushings which were attached to the castings before machining. The crux of the question which the purchasing agent asked is whether or not foundrymen are expected to make any allowance for the cost of the machining or of the brass bushings. The manufacturer who supplied the castings agreed to replace them, but would not allow for lost labor or material.

The specification involved provides for the usual chemical and physical properties and tests of the castings, demands good sound iron, free from flaws, blow holes, fins, cold shuts or shrinkage cracks, etc., but as to those which fail to meet requirements, simply stipulates that they will be rejected and returned to the founder at his expense.

The following views on the subject were obtained from an official of an automobile company who is a purchaser of castings, and from three officers of foundry companies which do jobbing work in considerable volume:

STANDARD RULES OF VENDING APPLY

From the production manager of an automobile plant:

I would say that the answer can be based on the standard practice according to which vendors establish their prices; they replace anything defective as received by the purchaser, but replace labor upon the repair of defective products only on specific agreement to that effect. If we, in our business, wilfully start material into production that later proves defective, we do not claim any losses except that of the part as received from the vendor, because our contracts and agreements do not contain a provision enabling us to do otherwise. Such provision would of course necessitate higher prices.

Goods are usually sold on the assumption that they are good; if not, that they will be replaced. But since the vendor has absolutely no control over the cost of labor engaged by a purchaser on defective goods, it is self-evident that he should not be called upon to assume responsibility for such work done. In our own case we ship an automobile supposedly perfect. The receiver may find something defective. If he will return the defective part to our factory, we will replace the part, but any labor of such replacement must be his responsibility, unless there has been a special provision made in the individual case.

We have had many labor costs paid by the vendor on defective materials, the seller authorizing us to repair at his expense. In a great many cases it is more economical for the vendor to stand this expense than to bear the cost of the rejection. The general principle will apply to castings as well as to other materials.

The following opinions came from foundry managers:

Will Pay for Some Repairs

Our general custom regarding the question you mention is that we agree to replace all castings which may prove defective, but do not allow for the cost of labor spent on them. There are times, however, when, by allowing an expenditure of a small amount, we can save the casting and in this case we are usually willing to pay this amount. When a customer requests that machine work spent on defective castings will be deducted from bills, we arrange to make our price sufficient to cover the possibility of such a deduction.

Allowances Under Special Arrangements

Our custom, and we believe it is universal, is not to allow any machine work on castings that prove to be defective. We go further and will not allow any machine work that may be done in order to make castings that are imperfect usable, unless this is arranged beforehand.

If machine shops were allowed for machine work done on defective castings, either the foundries would have to receive very much larger prices or the foundry business would become altogether unprofitable.

In regard to the brass bushings the only remedy the railroad company would have would be to remove the bushings and retain whatever scrap value is in them.

Will Replace Castings Only

As far as we know, it is a universal practice for foundries to replace such castings as prove defective after being machined but to pay no machining cost. The justice of this can be readily seen from the fact that the purchaser of the castings can tell by preliminary inspection, just as well as the foundrymen can tell, whether or not the castings are defective, and it is not fair to charge the foundryman with the expense of machining castings which he did not know were defective and had no means of ascertaining.

Exception in Cases of Deceit

An official of a company which both buys and sells castings says:

The foundrymen feel that the expense involved in furnishing a replace casting and paying the transportation charges is all that can be reasonably expected of them. We ourselves purchase brass castings and steel castings and have never been able to recover any expense we were put to in machining castings which proved defective, and we invariably decline to make any allowance for machining expense on iron castings of our manufacture which prove defective. There are cases, however, where foundrymen may with reason be asked by the purchaser to pay for machine time put on defective castings; for instance, in case the defect was purposely covered up by the foundrymen and was not visible under ordinary inspection.

To Make Welded Copper Coated Products

The Duplex Metallic Company is the name of a new corporation capitalized at \$200,000, which will erect a plant at Conshohocken, Pa., for the manufacture of products of iron or steel with a welded copper coating. It is stated that the company is the owner of the basic patent for this purpose. The property purchased for the plant consists of a plot, 196 x 493 ft., adjacent to the Reading and Pennsylvania railroads. A mill building of structural steel frame, 60 x 200 ft., has been contracted for. It will be equipped with heating, melting and coating furnaces and a 16-in. and a 10-in. train of rolls. It is expected to have the plant ready for operation by May 1, as most of the equipment is already on the ground. The machinery will all be electrically driven and power will be purchased. The product of the company will at first be $\frac{3}{8}$ -in. wire with a coating of copper welded on the steel. The Conshohocken Recorder states that the efforts of a former company in this line had been confined to the wire business, but that the new company will eventually enter into the much broader field of welding a coating of copper on iron and steel sheets. The officers of the company are as follows: B. C. Kenyon, president; R. E. Bishop, vice-president; A. M. Harrington, treasurer; J. S. Kenyon, secretary. Mr. Harrington and Mr. Bishop are members of Edwin Harrington, Son & Co., Inc., Philadelphia.

The Pelton Steel Company, Milwaukee, Wis., the organization of which has previously been noted, will start operations about April 1 at Chicago Avenue and Elliott Place, on the southern limits of the city. The business will be in general charge of E. T. Pelton, for 12 years associated with a large steel foundry interest. The installation of an electric furnace cannot be made until some time in May because of the extraordinary demand for these units, and until June 1 the company will produce only crucible castings. After that both crucible and electric steel will be turned out. Enough orders have been booked to keep busy for months.

The sulphuric acid production of the United States for 1915 is estimated at 4,007,000 net tons of 50, 60 and 66 deg. acid, expressed in terms of 50-deg. strength, according to the U. S. Geological Survey. Nearly 49,000 tons of fuming acid and oleum was also made. The 1914 output was 3,762,417 tons as 50-deg. acid. This is an increase of 6½ per cent in the three common grades. The estimates are based on returns compiled by W. C. Phalen.

American Radiator Company's Year

The seventeenth annual report of the American Radiator Company, giving the result of operations in the fiscal year ended Jan. 31, 1916, has been issued. It shows net profits of \$2,364,953, against \$2,289,075 in the preceding year. The income account for these two years is as follows:

	1915-6.	1914-5.
Net profits	\$2,364,953	\$2,289,075
Preferred dividends	210,000	210,000
Balance	\$2,154,953	\$2,079,075
Common dividends	1,309,696	911,580
Common stock dividend	744,000	
Surplus	\$845,257	\$423,395
Previous surplus	7,127,586	6,704,190
Total surplus	\$7,972,843	\$7,129,586

The balance sheet as of Jan. 31, 1916, shows net quick assets \$7,180,321, against \$6,675,578 a year before, with \$3,000,000 preferred and \$8,185,000 common stock, but no bonded debt.

From the accompanying remarks of President Clarence M. Woolley, the following extracts are taken:

"The general depression which prevailed during the early months of the year, due to the effect of the war upon financial and commercial affairs in this country, was responsible for a slight decrease in the volume of sales. The number of new buildings constructed during the first half of the year was less than that recorded for several years preceding, while the purchasing disposition of the public was such as to reduce the demand for installations in old buildings. All of these conditions brought about a decrease in the volume of business for that period.

"At the opening of the second half of the year general business conditions throughout the country began to improve, such improvement gaining in momentum month by month until the end of the year. As a consequence of this impetus the volume of sales during the second half of the year was considerably greater than it was for the corresponding period of the preceding year.

"The advance in the market price of raw materials continued throughout the second half of the year, and our selling prices were increased to accord therewith. The company, due to the high quality of its product and the superior service rendered, obtained proper recognition from its customers for these advantages, and a moderate increase in net profits was realized.

"The companies which formed the American Radiator Company originated the sectional cast-iron radiator industry 32 years ago, and your company continues to maintain the position of primacy by efficient management and fair service to the public, . . . operating from 31 sales branches and warehouses located in the principal industrial and distributing centers of the country. It encounters aggressive competitors in various parts of the country, many of whom have participated in the growth which the industry as a whole has enjoyed.

"The business of the company is exclusively that of manufacturing and selling radiators and boilers to the heating trade. Thirty years ago there were not to exceed 400 firms regularly engaged in the business of installing steam and hot water heating apparatus throughout the entire country. To-day the number has increased to more than 10,000.

"The industry has been extended in proportion to the increase in the number of heating firms who have applied technical skill and practical experience to render satisfactory service to their customers. Their co-operation has ever served as an influence to augment the demand for modern heating apparatus.

"Improvement of product and refinement in manufacturing methods have brought about a reduction of 50 per cent in the selling price since 1884. In consequence, modern and sanitary heating methods have become available to a large number of house owners. Formerly their benefits were confined to the few; to-day they are within reach of a large proportion of the general public. This industry ranks in importance with those supplying food, clothing and shelter, as it offers household warmth and sanitary protection, while effecting actual economies in fuel consumption.

"The aggregate value of the tangible assets of the

company at home and abroad, including reserves at the close of the last fiscal year was \$26,241,210. The net profits of the entire business, domestic and foreign, were therefore equal to 10 per cent of the said tangible assets.

"The foreign business during the last year was seriously affected by the war; and while there has been a fair demand for the products of the European companies, their output due to existing conditions was limited, and resulted in a large curtailment of their sales. No dividends have been declared by any of the foreign companies since their establishment, the entire profits having been utilized for the development of the business abroad. For this reason their income has not been included in the balance sheets of this company. The aggregate net profits of the foreign companies for the fiscal year ended Jan. 31, 1916, were \$302,580.41. The aggregate surplus of the foreign companies as of Jan. 31, 1916, were \$6,699,031.89. The combined surpluses of the parent and foreign companies as of Jan. 31, 1916, were \$14,671,874.84."

Railway Steel Spring Company's Year

The annual report of the Railway Steel Spring Company for the year ended Dec. 31, 1915, shows net earnings of \$1,688,465, against \$713,285 in the preceding year. The income account for these two years compares as follows:

	1915.	1914.
Gross earnings from all sources	\$7,043,957	\$4,351,465
Manufacturing, operating, maintenance, repairs, administrative expenses, depreciation, etc.	5,355,492	3,638,180
Net earnings	1,688,465	713,285
Interest on Latrobe and Inter-Ocean bonds	325,237	338,831
Balance for dividends	1,363,228	374,454
Dividends on preferred stock	945,000	945,000
Surplus for the year	418,228	*570,546
Previous surplus	3,954,657	4,525,203
Total surplus, Dec. 31	\$4,372,885	\$3,954,657

*Deficit.

From the accompanying remarks of President F. F. Fitzpatrick the following extracts are taken:

"The net earnings for the year amounted to \$1,688,465, this being the result after making liberal expenditures for repairs and renewals, and a charge of \$379,811 for depreciation.

"The sinking fund provisions of the Latrobe plant bonds and of the Inter-Ocean plant bonds were complied with during the year. The trustees of the sinking funds redeemed and had cancelled \$136,000 in par value of the Latrobe bonds and \$134,000 in par value of the Inter-Ocean bonds. The amounts of the respective issues now outstanding are \$3,127,000 and \$3,231,000. The total amount of bonds so far redeemed through the operation of the two sinking funds is \$1,642,000, which represents a reduced annual interest charge of \$82,100.

"The first half of the year showed very little, if any, change in the very severe business depression which existed throughout the year 1914, and no improvement was apparent until July, when the demand for the products of the company became more active. From that time forward, there was a steady increase in business each month, and the aggregate results are due entirely to the improved conditions prevailing during the last half of the year. The maintenance of the plants at a high degree of efficiency, in accordance with the established policy of the company, made it possible to take immediate advantage of the increased volume of business.

"Every indication points to a continuance of favorable conditions throughout the year."

The Pennsylvania State Highway Department has awarded contracts for road machines under bids opened Feb. 23 as follows: The Good Road Machinery Company, Kennett Square, Pa., 37 machines; Austin Western Road Machinery Company, Philadelphia, 38 machines; Brinker Supply Company, Pittsburgh, 10 machines; Galion Iron Works & Mfg. Company, Galion, Ohio, 10 machines.

J. V. W. REYNERS RESIGNS

Quincy Bent Appointed General Manager of the Steelton, Pa., Plants

J. V. W. Reynders, vice-president and a director of the Pennsylvania Steel Company, recently acquired by the Bethlehem Steel Company, tendered his resignation March 7 and retired from the management of the Steel-

ton, Pa., works. At the same time he issued an executive order appointing Quincy Bent, who has been assistant to President F. W. Wood of the Maryland Steel Company, Sparrows Point, Md., to the position of general manager of the Steelton and Lebanon plants, a position newly created. Mr. Reynders has not as yet decided on his plans, but will remain in Steelton for three months putting the affairs of the Pennsylvania Steel Company in shape for the formal transfer. His resignation is in line with the policy of the new management to centralize the executive officers of all the recently acquired properties at South Bethlehem, and limiting outside organizations to the immediate operation of the respective plants.

Mr. Reynders is 49 years old and was born in Hoboken, N. J. He was educated at the Gymnasium at Wesel, Germany, and at Rensselaer Polytechnic Institute, Troy, N. Y., where he graduated as a civil engineer. He first entered the employ of the Pittsburgh Bridge Company as a designer in 1886 and after two years went to the Snead & Co. Iron Works, Louisville, Ky., later being connected with the Penn Bridge Company, Beaver Falls, Pa.; the Union Bridge Company, Buffalo, and the Edgemont Bridge Company, Wilmington, Del.

When the bridge and construction department of the Pennsylvania Steel Company was organized in 1892 he was appointed engineer and a year later superintendent in charge. He continued as superintendent of this department until 1906, when he was made a director and vice-president of the company, in charge of operations at Steelton and Lebanon, Pa. In 1902 and 1903 he rebuilt the bridge and construction shops, making them among the best in the country. He also supervised the important improvements of the past few years at Steelton, which included a 44-in. blooming mill, 28-in. rail and structural and finishing mills, 500-ton blast furnace, an eye-bar plant heating furnace and forge plant, 14 and 16 in. mills, new power department and many minor improvements which have greatly increased the productivity of the Steelton plant.



J. V. W. REYNERS



QUINCY BENT

Sparrows Point in the intervening years, in which considerable new construction has been carried on there. He is 36 years of age.

Bethlehem Steel Company Bonuses

Charles M. Schwab in a newspaper statement of the past week referring to the bonus system of the Bethlehem Steel Company denied the reports that any such amounts as \$1,000,000 to one officer and \$600,000 to another were paid last year. He added: "Some of the officials at the steel works receive handsome salaries, because they earn them, and some of the mechanics and other workmen receive handsome wages, also because they are worthy of their hire; but my chief concern is the payroll, from which everybody gets something, and I am not especially busy in trying to make one or two millionaires."

The total of bonuses paid last year has been put at \$3,000,000 to \$4,000,000. A good many of the mechanics whose regular pay in normal times would be \$3 a day have been earning from \$80 to \$90 every two weeks, bonuses included, and a large number as high as \$60 fortnightly. The highest bonus paid to any department head last year is said to have been \$24,000.

Blooming Mill Stoppage

Due to a breakdown of the blooming mill engine of the Minnesota Steel Company at Duluth, Minn., the production of steel billets at this plant will be interrupted for three or four weeks. Meanwhile steel ingots are being shipped to the South Chicago works of the Illinois Steel Company.

The Kearney & Trecker Company, Milwaukee, Wis., manufacturer of the Milwaukee miller, has recently added to its plant capacity, installing new machine tools to the aggregate value of about \$80,000. The new equipment includes a Pawling & Harnischfeger crane.

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The New Steel Consolidations

No little discussion in the steel trade was devoted, in the pendency of various negotiations for consolidations in the past few months, to the possibility that one or more of these projects would encounter Government opposition. In some cases there was little or no competition between the companies—as in the case of the Youngstown Sheet & Tube Company and the Lackawanna Steel Company, for example, or the Midvale Steel Company and the Worth Brothers Company. But even where identical products were manufactured, as represented, for instance, by plates, shapes and bars in the case of the Cambria Steel Company and the Lackawanna Steel Company, the plans of the promoters went forward with apparent assurance that no legal obstacle would be encountered in the Sherman act or the Clayton act.

The relatively small proportion involved, of the country's total production in these lines, may have been the ground of this confidence, since neither monopoly nor potential monopoly, nor the power to restrain trade by control of prices, could be attributed to any of the combinations proposed or those put through in the steel trade in the past six months. There was much to be said in their favor, moreover, on the score of rounding out their lines of manufacture, so that by integration they might enter full armed upon the foreign trade campaign, the undertaking of which, more than ever since the opening up of the war, has been pressed home upon our manufacturers as well nigh a patriotic duty. It was chiefly on its great achievements in the export field that the United States Steel Corporation won the decision given by the United States Circuit Court of Appeals last year. It is not hard to see, in the light of that decision, to what account the corporation's counsel would have turned its foreign trade record since the war, had the making up of its case been deferred to these days of prodigious shipments to the markets of the world. From this time on, as all the machinery of Government will be applied to extending the field for American steel products in competition with Germany and Great Britain, it is to be expected that Government harassment of great integrated steel companies will more and more go out of fashion. So much, indeed, may fairly be deduced from recent trade

developments and from what the Federal Trade Commission has been telling manufacturers.

In this connection the Midvale acquisition of the Cambria Steel Company, with its American Steel Export Company, and the Bethlehem Steel Corporation's ambitious export plans for its newly acquired Sparrows Point plant are highly significant. Whatever comes of the proposal, discussed at times by independent steel manufacturers, for co-operation in the export trade, it is certain that the Steel Corporation will have important company from this time on in the carrying on of a world business in American steel products.

One feature of the Bethlehem Steel Corporation's recent absorption deserves attention in this connection as indicating the effect of the Clayton bill upon future organization in the steel industry. Official changes pending or already made in the Pennsylvania Steel Company and the Maryland Steel Company indicate that the machinery of holding company and subsidiaries is to give way to a single operating company, the ownership of the newly acquired companies to be through the purchase of their assets. Like problems remain to be worked out elsewhere in the steel industry. In the case of the Steel Corporation the number and diversity of selling organizations under the present alignment is one of these problems. While supply and demand and soaring prices have been uppermost in these amazing times, other phases of the situation are developing that bear particularly on the future conduct of consolidations and their ability to deal with conditions they will meet after the war.

The 1915 Pig-Iron Output

Production of pig iron in the United States in 1915 compared as follows with that in 1914, the poorest year since 1908, and that in 1913, thus far the banner year, though if the present pace continues this year will have produced as much iron by October 15 next as was made in 1913:

Pig-Iron Production by Merchant Interests and by Consuming Interests—Gross Tons

	For Sale	For Consumption	Total
1913	9,523,885	21,442,267	30,966,152
1914	7,362,980	15,969,264	23,332,244
1915	8,583,007	21,338,206	29,916,213

It will be observed that while the total produc-

tion was 1,050,000 tons less in 1915 than in 1913, or 3.4 per cent, the steel interests produced only 109,000 tons less, or one-half of 1 per cent. The proportion of merchant iron was: 1913, 30.8 per cent; 1914, 31.6 per cent; 1915, 28.7 per cent. It will be recalled that during the first half of 1915 the pig-iron market languished, while steel was steadily strengthening; also that in the late months of the year the steel works reached a very heavy rate of steel production, without buying merchant iron as freely as they have in past periods of pressure.

Last year's production of ferromanganese was 129,072 tons, breaking the former record, 125,378 tons, made in 1912. The production in the second half of last year was 83,628 tons, or at the rate of 167,000 tons a year. In 1912 and 1913 the supply of ferromanganese, the production plus the imports, averaged 235,000 tons a year, while the total production of steel ingots and castings averaged 31,275,000 tons a year. Thus our production in the second half of last year was 71 per cent of the average supply in 1912-13. Imports last year were larger in the second half than the first half, amounting to 34,796 tons in the second half, so that the production and imports in the second half were at the rate of 237,000 tons a year. Thus on the basis of experience in the second half of last year the deficiency in ferromanganese would be measured quite closely by the amount that steel production has increased since the average of the years 1912 and 1913.

The statistics of molten iron delivered show quite closely the extent to which the direct metal process is practised. In 1913 there was 212 tons of metal other than Bessemer or basic that was delivered molten, in 1914, 9639 tons, and in 1915, 1300 tons. The 1912 statistics do not separate Bessemer and basic iron. The tonnages and the proportions of the total output of Bessemer and basic used direct were as follows:

	Bessemer	Basic
	Gross Tons Per Cent	Gross Tons Per Cent
1912	16,466,722	71.2 per cent
1913	7,823,317	67.5
1914	5,465,565	69.7
1915	7,458,822	70.7
		73.8

There is a slight progressive increase in the proportion of direct metal used, but the most interesting showing of the above compilation is that in a lean year the proportion of direct metal decreases. This can hardly be attributed to the smaller works being less active in lean years than the larger, and is probably to be ascribed to the fact that with the intermittent operations attendant upon dull times more iron is stocked by the larger interests, for longer or shorter periods, than in active times.

While the total production of pig iron in 1915 was 1,050,000 tons less than in 1913, the production of Bessemer, basic, spiegeleisen and ferromanganese was only 513,000 tons less. As this latter deficiency may have been made up by the use of larger tonnages of scrap, produced in the heavy cropping required to fill war orders, it is possible that there was a larger production of steel ingots and castings last year than in 1913, when the output was 1,020,744 tons of castings and 30,280,130 tons of ingots, a total of 31,300,874 tons.

Railroad Earnings

The remarkable earnings the railroads have been enjoying in recent months are succinctly shown by the monthly reports of the Bureau of Railway Economics. The net operating revenue per mile of road in the past three months reported upon shows the following gains over the corresponding months a year earlier: October, 32.4 per cent; November, 72.0 per cent; December, 71.7 per cent. The comparisons are made with months that were not particularly poor, though it is true they were not as good as the corresponding months of 1913. The net operating revenue in each of the last three months of last year was easily in excess of all previous records. The total operating income was slightly larger, on an average, than at any time in the past, while on account of the important economies in operation effected in the past two years the net revenue shows important gains. The showing of last December, per mile of line, including 229,235 miles, roads having annual gross income of \$1,000,000 or more, is as follows, with the percentage increase over December, 1914:

	Per Mile	Increase
Total operating revenues....	\$1,253	26.2 Per Cent
Operating expenses	802	9.9 Per Cent
Net operating revenue.....	\$451	71.7 Per Cent

Other conditions being equal, the railroads usually show material decreases in gross income after October and November, when the heaviest crop movement takes place. This time, however, there is very little decrease apparent, because industrial conditions generally have been growing more active. A year ago there was a sharp decrease in both gross and net, the net falling from \$402 per mile of line in September, 1914, to \$220 in January, 1915. This time the maximum net came in October, \$508, and there was a decrease to \$503 in November and \$451 in December. If the January net turns out to be \$440 it will represent an increase of 100 per cent over the preceding January. Should the railroads find themselves able to handle, and handle economically, the freight business offered, their net operating revenue could probably run easily at \$500 per month per mile of road for months to come. It is to be noted, however, that with all the congestion on the Eastern roads their net earnings in December were very large. While the increase shown above for the whole country is 71.7 per cent, the Eastern roads alone showed 106.3 per cent, against 55.5 per cent for the Southern roads and 53.9 per cent for the Western.

Shortage of Immigrant Labor

The total movement of citizens and aliens into and out of the United States resulted in a net increase in population of 754,205 in the fiscal year ended June 30, 1913, and an increase of 687,065 in the following fiscal year, representing an average increase in population in the two years of 60,000 a month. In the nineteen months from July 1, 1914, to Feb. 1, 1916, the net increase has been but 128,663, whereas at a rate of 60,000 a month there would have been an increase of 1,140,000 in the

period. Thus there has accumulated a deficiency, on the basis of the former rate, of 1,011,337. A general survey of industrial conditions would suggest that with the present activity it might have been possible to find work for the usual quota of immigrants. It is certainly obvious that with an increase in population, due to the movement into and out of the country, only 11.3 per cent as great since July 1, 1914, as in the two years preceding, a situation altogether unusual in the labor market is being created.

Effects of High Prices Contracted

The contrasting reports of the markets of the East and the West as presented in THE IRON AGE of March 2, in their reference to the effect of high prices upon new business, emphasize differences in conditions in the two sections. As has been pointed out frequently in the year past, producing capacity in the West was more slowly absorbed in the manufacture of materials for export. For this there is the natural explanation of geography, which also applies to the abnormal ship-plate tonnage on the books of mills east of Chicago. For various reasons there have been in the West much more liberal reservations of tonnage to protect the requirements of regular customers and normal domestic business than in the East. A striking example of this was the recent distribution by two prominent Western mill interests of last half tonnage to all customers on the basis of their average requirements of other years. In contrast, various Ohio and Pennsylvania mills have not as yet formally opened their books for last half contracts.

Steel users in the West who have regularly depended upon Pittsburgh and farther eastern mills share in a degree the plight of their Eastern contemporaries, while also, both east and west, there are special demands for steel beyond the ability of any mill to deliver as desired. Thus east of Chicago a great tonnage which would normally be under contract is still unplaced, and manufacturers whose very operations are at stake are compelled to purchase material wherever it may be had and at whatever cost. In the case of many Western consumers the corresponding tonnage is already assured, and at a price, relatively considered, not excessively high. Finished steel now being placed as new business on the basis of 2.25c. to 3.25c., Pittsburgh, contrasts with corresponding tonnage in the West that is going to the mills as specifications against contracts booked on the basis of 1.90c. or less.

This disparity is likely to be steadily increased. Fabricators in the Chicago district, for example, feel sufficiently secure as to steel to justify the selling of small lots of plain material from their own stocks at store prices. In another way, the idea of merchandising has also taken the form of restricting their fabricating to the small contracts for which the highest prices can be obtained, rather than accepting the ordinarily desirable jobs of large tonnage. An inquiry for 3000 tons now current has been variously refused as too big. On the other hand, the comfortable supply of material explains certain moderate prices quoted on recent desirable work.

It would appear, therefore, that the West has not yet been brought to that acceptance of high-level prices as compulsory which, in view of insistent war demand, is bringing the unchecked rush of tonnage in other districts. In the West the proportion of the total business which cannot be taken care of out of tonnage already reserved will be smaller than in the East, and will consist more largely of work that can be deferred. Thus what may not be yet apparent with respect to the prohibitive effect of current prices in the East is already in evidence in the West.

CORRESPONDENCE

Proper Tariff Commission Functions

To the Editor: Your issue of March 2 contains an article under the title, "Politics in the Tariff Commission," which is most timely and pertinent. In addition to the fault which you point out in the proposed plan for selecting the members of the tariff commission is the old fallacy embodied in the theory that the commissioners themselves are to be technical experts and to do the necessary technical work. If such a plan were feasible it would follow that each commissioner would practically be the sole arbiter as to the subjects committed to him, and therefore that each subject would be acted on by an individual, not by a group or commission. The experience of the late Tariff Board showed conclusively the impossibility of doing what is thus implied. No twenty men could possibly possess the vast amount and range of technical knowledge required to deal with all of the arts and industries of this country. For this purpose a large staff of technical assistants will be indispensable, and an essential to continued success will be that the men thus found competent shall be retained permanently and their accumulated experience made available.

The proper functions of the commissioners, as I believe all of those best qualified agree, should be administrative and judicial. In their administrative capacity they will be responsible for the selection, appointment, direction and control of the technical staff. In their judicial capacity they should review the work of the staff, approve, amend, or reverse its findings, consider and determine the proper findings in cases of doubt or of exceptional importance, and unite in formulating reports to Congress or the President. The purpose in view would be defeated by attempting to create a commission composed of a group of specialists, each intended to have jurisdiction of a fractional part of the tariff problem.

We urgently need a tariff commission, but let us recognize that its functions will cover the whole range of our industrial and commercial activities, that the duties of the commissioners should be to organize a competent technical staff, to direct its work, to approve or amend its findings, and to compile the reports called for by Congress or the President. On this basis a board of five, or possibly seven, commissioners will probably be more expedient and efficient than one having a larger membership. The essential qualities in the commissioners are character, ability, freedom from bias, and the judicial temperament.

HENRY R. TOWNE

New York, March 7, 1916.

Ferromanganese Imports in January

Ferromanganese imports into the United States in January, 1916, according to official figures, were 5397 gross tons, with a valuation of \$368,767. Of this total 2962 tons came to Baltimore, 1350 to New Orleans and 1085 to Philadelphia. The January imports exceed the average for 1915, which was 4600 tons per month.

Lackawanna Steel Company's Report

In the issue of THE IRON AGE of Feb. 17 the financial results of the Lackawanna Steel Company in the year ended Dec. 31, 1915, were printed. The complete report of the company has just been issued, and from it the following statement by President E. A. S. Clarke is taken:

"The results of the year 1915 have fully justified the forecast of a year ago, that orders would continue to increase, as well as the hope then expressed, that the year 1915 would show improvement over 1914. By the end of March the demand for steel for export had become considerable and the company secured large orders at profitable prices. The volume of domestic business gradually increased during the first half of the year, with moderate increase in prices; and the last half showed a gain in volume of orders and prices for both domestic and export business that enabled your works, especially during the last quarter, to run at maximum capacity and large profits, the year closing with the greatest volume of orders on hand and at the highest prices in the company's history.

"The company received during 1915, from mines which it owns or is interested in, and from other sources, 1,727,804 gross tons of iron ore and produced a total of 844,684 gross tons of coke and 918,772 gross tons of pig iron. It also produced 122,533 gross tons of Bessemer ingots and 1,040,218 gross tons of open-hearth ingots, a total of 1,162,751 gross tons of steel ingots of all kinds. Shipments of products were as follows, all in gross tons, the figures for the years 1913 and 1914 being given for comparison:

	1915	1914	1913
Standard rails	276,692	176,877	336,339
Light rails	5,327	6,384	8,376
Angle bars, fittings, etc.	74,165	47,788	75,606
Structural shapes	111,613	85,568	138,538
Plates	44,809	25,941	57,529
Merchant steel products.....	229,276	102,259	163,887
Sheet bars, slabs, billets and blooms	67,487	44,464	62,045
Pig iron and miscellaneous.....	94,463	90,461	142,601
Total	903,832	579,742	984,921

"Open-hearth ingot producing capacity was increased about 17 per cent by the completion of four 70-ton furnaces. Four more furnaces of the same size are now under construction and should all be in operation early in the third quarter. This will complete all authorized open-hearth ingot capacity and should permit of full operation of the company's existing mills together with the new 8-in. and 12-in. combination bar mill which the directors authorized toward the end of 1915. This mill is expected to be in operation before the end of this year. The directors also authorized the construction at Buffalo and Lebanon of plants for the recovery from the gases of the by-product coke ovens of benzol and its homologues. The Buffalo plant began operations in May, 1915, and the Lebanon plant in November. The results of their operation have been very satisfactory.

"Prior to March 1, \$375,000 face value of the company's five-year 5 per cent convertible gold debentures was purchased in the open market, making a total of \$3,589,000 face value purchased, at a saving of \$135,794.64. These debentures were canceled as of March 1, 1915, and the balance of the outstanding issue of \$9,994,000 was paid at the same time, the proceeds of the sale of \$6,000,000 face value of the company's 6 per cent two-year gold notes being applied thereto. The profit from the purchase of debentures was applied against the extinguishment of the discount on the gold notes, and the balance has been charged off against surplus account as of Dec. 31, 1915.

"During the year \$121,000 face value of bonds of subsidiary companies was redeemed and canceled. The \$6,000 face value of preferred stock issued against conversion of debentures was also purchased and is held in the company's treasury, so that there is no preferred stock now outstanding.

"While working capital, as shown by the surplus of current assets over current liabilities, has decreased \$1,241,479.58, owing principally to the reduction of capital obligations during the year, it is still entirely sufficient for the company's needs and stands at \$15,-

299,457.25. Cash on hand and in banks amounts to \$2,901,431.27, an increase of \$640,343.27 over 1914.

"Publication of the necessary legal notice of the redemption and payment on March 31, 1916, at 101 per cent and accrued interest, of the entire outstanding issue of \$6,000,000 face value of the company's 6 per cent two-year gold notes maturing March 1, 1917, has been begun. Of the amount necessary for this payment \$2,000,000 will be provided from cash on hand and the balance has been borrowed on favorable terms, which will effect a considerable saving in interest, with the further advantage that repayments can be made from time to time as funds are available.

"Orders on hand as of Dec. 31, 1915, were 812,680 gross tons, and additional sales made during 1916 should insure full operations for this year. Prices are very profitable and the outlook for 1916 is the best in the company's history."

Allied Machinery Company Taken Over

The American International Corporation has purchased the Allied Machinery Company of America, and proposes to extend and develop the business of that company. The Allied Machinery Company, capitalized at \$200,000, was formed some four years ago by interests connected with the National City Bank, New York, for the purpose of assisting American manufacturers of machine tools to place their products in foreign markets. The company has been engaged in selling machine tools in Europe, and it now intends to expand its business more widely.

The company has offices and show rooms in Paris, Petrograd, Zurich and Turin. It did have branches in Austria and Hungary, but they are now closed on account of inability to ship goods. Charles A. Stone, president American International Corporation, states that the taking over of the company by his corporation is in line with its program of procedure, which was announced at the start, for assisting American interests in securing business relations with foreign countries.

The Allied Machinery Company of America was first managed by Capt. Godfrey L. Carden, of the United States revenue cutter service, who spent several years in Europe investigating for the United States Government the possibilities there for American machine tools. It was his exhaustive reports on the subject that led to the formation of the company. Subsequently Captain Carden returned to his naval duties and was succeeded as general manager by Charles E. Carpenter, now in Europe. Since the beginning of the war demand for machine tools the Allied Machinery Company has done a very large business in continental Europe, especially in France, Russia and Italy, and has been compelled to enlarge its sales forces in those countries. It is the European representative of a number of machine-tool builders.

To Make Boron-Copper for Deoxidizing

The American Boron Products Company, Reading, Pa., recently incorporated, is equipping a foundry for the production of boron-copper. This is a deoxidizer used in the purification of non-ferrous metals and iron and steel, and also for securing more homogeneous alloys of various kinds. The equipment will consist in part of a Monarch melting furnace made by the Monarch Engineering & Mfg. Company, Baltimore, Md., and a pressure blower made by the P. H. & F. M. Roots Company, Connersville, Ind. It is the intention of the company to install three furnaces, with a combined capacity of three tons per day.

It is asserted that by adding from 1 to 5 per cent of boron-copper to other metals, or combinations of metals, a mixing or stirring of the whole melt is caused, during which they are cleansed of oxides. In varying proportions it is used in the production of copper castings and aluminum bronze, and to prevent loss of zinc from oxidation; for anti-friction metal, brass bearings and other uses, including the making of nickel steel. The tensile strength of nickel steel is said to be increased by substituting boron-copper for one-half of the usual nickel content.

SHIPPING LEGISLATION

Proposed Board of Maritime Control Not an Early Likelihood

WASHINGTON, D. C., March 7, 1916.—Circumstantial statements have recently appeared in the daily press to the effect that Congress, at an early date, will enact a bill now pending before the House Committee on the Merchant Marine and Fisheries to establish a so-called Board of Maritime Control with exceedingly broad powers affecting the plans, construction and operation of merchant vessels. These reports have created considerable apprehension among shipbuilders and producers of shipbuilding material and many inquiries are being received here by public men as to the character of this measure and the prospects for its enactment.

The bill in question was recently introduced by Representative McArthur, of Oregon, and proposes in effect to supersede the Supervising Inspector General of the Steamboat Inspection Service and the Commissioner of Navigation by a board to consist of seven members, to include the two officials referred to and five additional members to be appointed by the President. Each of the appointive members shall have had not less than five years' actual seagoing experience, and in addition, not less than five years' experience in the management and handling of shipping. At least one shall be a marine engineer.

The correspondent of THE IRON AGE is in position to state that the reports that this bill will have the support of the Administration are wholly without foundation. The officials of the Department of Commerce are opposed to the measure for several reasons. No good object could be served, in their opinion, by the appointment of a cumbersome board of seven men to do what is now being done by two experienced officials. It is also regarded as unwise to consolidate the Steamboat Inspection Service with the Bureau of Navigation. Finally the Administration's shipping bill, now pending before the House Committee on the Merchant Marine and Fisheries, provides for the establishment of a shipping board which would exercise some of the functions of the proposed Board of Maritime Control.

THE ADMINISTRATION'S SHIPPING BILL

Slow progress is being made with the Administration's shipping bill in the House Committee. A protracted series of hearings is now drawing to a close, but thus far the promoters of this legislation have been unable to arouse much enthusiasm for its enactment. The revenue situation is a strong argument against the \$50,000,000 appropriation proposed by the bill, especially in view of the fact that such a sum would be wholly inadequate to supply any considerable proportion of existing requirements. Another impressive argument against the bill is found in the recently compiled reports from the shipyards of the country showing that at the present time contracts are in hand for 230 vessels, aggregating about 1,000,000 gross tons, demonstrating that there is no basis for the assertion, so frequently made by Administration officials, that private capitalists are not responding to the existing emergency.

W. L. C.

Discussion of Corrosion

The New York section of the American Electrochemical Society has accepted the invitation of the American Institute of Electrical Engineers to hold a joint meeting on Friday evening, March 10, at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on the subject of corrosion. The principal speakers will be Dr. Burton McCollum, Bureau of Standards, Washington, D. C., for the American Institute of Electrical Engineers, and Prof. William H. Walker, Massachusetts Institute of Technology, Boston, Mass., for the American Electrochemical Society.

The S. Keighly Metal Ceiling & Mfg. Company, Pittsburgh, has filed notice of an increase in debt of \$50,000.

Midvale Improvements at Johnstown

A party of officers of the Midvale Steel & Ordnance Company and its subsidiaries, consisting of W. E. Corey, A. C. Dinkey, W. B. Dickson, John C. Neale, S. M. Vauclain and W. P. Barba, in company with E. E. Slick, general manager of the Cambria Steel Company, made an inspection of the plants at Johnstown, Pa., on Monday, March 6. A number of improvements were decided upon, and the expenditure involved in those which will be recommended to the board of directors amounts to about \$2,250,000. An additional blast furnace will be built at once and a considerable number of by-product coke ovens. The remainder of the appropriation will be devoted to the development of coal properties and the opening of new mines.

The work of amalgamating the sales departments of the Midvale, Worth Brothers and Cambria Steel constituents of the Midvale Steel & Ordnance Company is now in progress. At the main offices at Philadelphia all sales operations are in charge of John C. Neale, who has been general sales manager of the Midvale and Worth properties. Mr. Neale has been elected president of the American Steel Export Company, the export organization of the Cambria Steel Company, succeeding William H. Donner.

New Open-Hearth Plant at Chattanooga

The Chattanooga Steel Company, Chattanooga, Tenn., has been incorporated under the laws of that State with a capital of \$3,000,000. The company proposes to build an open-hearth steel plant at North Chattanooga, four miles from Chattanooga, and has appointed the W. R. Miller Company, House Building, Pittsburgh, as contracting engineer for the entire plant construction. There will be two 75-ton open-hearth furnaces, each capable of making 90 tons per heat, with provision for four more of the same size to be erected later; also a 34-in. blooming mill, 10 tin mills, four sheet mills, hoop and cotton tie mills, and it is likely a universal plate mill will be built to roll plates up to 40 in. wide. Contracts have been placed with the National Roll & Foundry Company of Avonmore, Pa., for the blooming mill, sheet and tin mills and other equipment, and also with the Westinghouse Electric & Mfg. Company for a 6000-hp. motor to drive the blooming mill. Both these companies will receive contracts later for other equipment. The Harbison-Walker Refractories Company, Pittsburgh, will furnish all the refractories for the entire plant. Work has already started on the grading and excavating and a complete sewerage system is planned. C. E. James, of Chattanooga, was active in securing the plant and will probably be elected president. The capital is all supplied by Chattanooga interests. The contract calls for the making of steel on September 1 next, at which time it is expected the open-hearth furnaces and blooming mill, together with most of the finishing mills, will be completed.

Waste Material Dealers' Meetings

The National Association of Waste Material Dealers, whose headquarters are at 185 Summer Street, Boston, Mass., announces that its next regular meeting will be the annual meeting and it will be held at the Hotel Astor, New York, at 10 a. m., Wednesday, March 15. The metal division of the association will hold a meeting at the same place at 2 p. m., March 14. The third annual banquet of the association will be held at the same hotel at 7.30 p. m., March 15. A reception will be held in the half-hour preceding the time of the dinner. The nominating committee has recommended the re-election of Louis Birkenstein as president; Mark Sherwin, treasurer, and Charles M. Haskins, secretary.

The United States Cast Iron Pipe & Foundry Company March 1 removed its Southern sales office from Chattanooga, Tenn., to Birmingham, Ala. C. W. Gray is Southern sales manager.

New Domestic Producer of 50 Per Cent Ferrosilicon

The Keokuk Electro Metals Company expects to have in operation by April its new electric furnace plant at Keokuk, Iowa, near the Illinois border. Its production for the present will be about 2000 to 3000 tons per year of 50 per cent ferrosilicon. On account of the location, the company will be in a favorable position to supply the large steel plants of the Middle West. G. E. Weissenburger is president of the company; M. H. Christopherson, vice-president, and John Dillon, secretary and treasurer. Other directors are W. D. Baldwin and C. G. Comstock, president and vice-president respectively of the Otis Elevator Company.

Before the war ferrosilicon was imported from abroad on quite a large scale, principally from Canada and the Scandinavian countries, but this latter source has been practically cut off because of the difficult shipping situation. Germany and France produced sufficient for their own requirements and perhaps a small amount for export, but very little, if any, material from these two countries reached the United States. The steelmaker may also use silicon, but by far the largest tonnage is used in the form of the 50 per cent alloy which is easily soluble and does not disintegrate in transit.

The Goldschmidt Thermit Company, 90 West Street, New York, has been appointed sales agent for the new company.

Union Machinists' Strike at Buffalo

The Machinists' Union has ordered a strike at Buffalo, N. Y., for an 8-hr. day, a wage minimum of 40c. per hour, the abolition of piece work and premium work and the establishment of a closed shop. Although the machinists at a number of large plants have walked out, in compliance with the orders of the union, the strike has not yet become general, as many of the men are not inclined to abide by the arbitrary ruling of their officials regarding an immediate strike, preferring to take their chances for a satisfactory agreement with their employers. From 10,000 to 12,000 machinists are employed in Buffalo and not to exceed 1000 of them are members of the union.

When the union machinists of the Pierce-Arrow Motor Car Company, King Sewing Machine Company, American Car & Foundry Company, Ericsson Telephone Mfg. Company, Otis Elevator Company and D. H. Stoll Company walked out, the managers of the plants decided to close entirely, and 7500 employees at these factories are now idle in addition to the striking union machinists, numbering about 700. The 100 union machinists of the 1200 employees at the Crosby Company's plant voted unanimously against going out at the meeting of the local union, but were outvoted, 200 to 100, by members from other factories, and they have asked a ruling by Jacob Keppler, one of the vice-presidents of the International Machinists' Union, who is now due in Buffalo, on their appeal from the vote of the local union ordering them to strike. They claim that a three-fourths vote is required to call a strike and it was called by a two-thirds vote. At other shops, also, the machinists would have preferred to remain at work and arbitrate, and many men who have complied with the strike order have done so with bad grace.

The management at the Snow Steam Pump Works agreed to give the men an 8-hr. day providing the union guarantees the company three full shifts of men of the skill demanded.

P. J. Downey, the State mediator, and Louis Wiard, State Commissioner, have gone to Buffalo, and are making a determined effort to bring the strikers and the employers together for a settlement of the differences. Most of the employers are opposed to an 8-hr. day at this time because of the peculiar conditions of contracts now under way. A large majority of the machine shops in the city are members of the Employers' Association and will hold out indefinitely for the open shop, and as soon as strike trouble occurs in their plants they will simply shut down to fight the closed shop to a finish.

CONTENTS

Foundry for Marine Engine Castings.....	593
Rail Exports and Imports in 1915.....	595
New Research in Corrosion Resistance.....	596
Manufacturing Lathe with Few Speeds.....	600
Newark Foundrymen's Association.....	600
Philadelphia Foundrymen's Association	600
Collapsible Core Bar for Casting Pipe.....	601
Snyder Furnace to Supplement Converter.....	601
The Work, the Worker and His Wages.....	602
Manganese Ore Imports and Production.....	604
New Timken Heat-Treating Plant.....	604
Scrap-Cutting Machine	605
Copper Exports Very Large and Increasing.....	605
American Investments in South America.....	606
American-Russian Chamber of Commerce.....	608
January Iron, Steel and Machinery Exports.....	609
Six More Active Furnaces.....	610
Blast Furnace Notes	611
Canadian Pig Iron and Steel in 1915.....	611
Production of Pig Iron in the United States in 1915.....	612
Liability for Bad Castings.....	613
To Make Welded Copper Coated Products.....	613
American Radiator Company's Year.....	614
Railway Steel Spring Company's Year.....	614
J. V. W. Reynders Resigns.....	615
Bethlehem Steel Company Bonuses.....	615
Blooming Mill Stoppage.....	615
The New Steel Consolidations.....	616
The 1915 Pig-Iron Output.....	616
Railroad Earnings	617
Shortage of Immigrant Labor.....	617
Effects of High Prices Contrasted.....	618
Correspondence	618
Ferromanganese Imports in January.....	618
Lackawanna Steel Company's Report.....	619
Allied Machinery Company Taken Over.....	619
To Make Boron-Copper for Deoxidizing.....	619
Shipping Legislation	620
Discussion of Corrosion	620
Midvale Improvements at Johnstown.....	620
New Open-Hearth Plant at Chattanooga.....	620
Waste Material Dealers' Meetings.....	620
New Domestic Producer of 50 Per Cent Ferrosilicon.....	621
Union Machinists' Strike at Buffalo.....	621
Personal	622
Obituary	623
Iron and Steel Markets.....	624
New Owners of Robert Wetherell & Co.....	635
Finished Iron and Steel Prices Pittsburgh.....	636
Metal Markets	637
British Inquiries for Steel Products.....	637
Germany Forbids Certain Machinery Imports.....	638
Pittsburgh and Nearby Districts.....	638
Machinery Markets and News of the Works.....	639
New Trade Publications	648

PERSONAL

W. S. Chase, for 13 years head of the sales department of the National-Acme Mfg. Company, Cleveland, Ohio, has resigned. For the present he will devote himself to his personal affairs, and will spend much of his time on his ranch at Meridian, Idaho. Mr. Chase is one of the best-known men in the machine tool trade, not only in this country but in Europe. He has made a number of trips abroad, and being a keen observer, knows the principal cities of Europe exceptionally well. A German friend recently said of him that he knows Cologne as thoroughly as most Germans. The friendly interest he has always shown in the affairs of others, especially those of younger men, has made him universally liked and respected. Mr. Chase's connection with the National-Acme Mfg. Company began soon after its incorporation. The company has sent out a printed announcement expressing its appreciation of the service Mr. Chase rendered.

F. E. Greene, formerly general superintendent, French Oil Mill Machinery Company, Piqua, Ohio, has resigned to accept a position as superintendent of the Hendey Machine Tool Company, Torrington, Conn.

C. M. Easterly, Milwaukee, Wis., district sales representative of the Inland Steel Company, who has been sojourning on the Pacific coast since Jan. 1, returns to his office this week.

W. S. Howell, who has been in the service of the Chicago, Milwaukee & St. Paul Railway for 25 years, has been appointed to the newly created position of industrial agent, with headquarters at Chicago.

C. R. Messinger, vice-president Sivyer Steel Casting Company, Milwaukee, Wis., returned last week from a month's cruise in the West Indies.

W. W. Johnston, who has been connected with the Cleveland office of the Carnegie Steel Company, has resigned to become purchasing agent of the American Shipbuilding Company, Cleveland, Ohio, succeeding N. S. Thrasher, who recently resigned.

The New Jersey Zinc Company, 55 Wall Street, New York, announces the following organization changes effective March 1: E. V. Peters, assistant general sales manager; A. H. Peck, sales manager; H. Hardenbergh, general purchasing agent, and W. J. Lee, Jr., purchasing agent.

W. W. Kerr has been appointed general sales agent of the Adrian and Punxsutawney furnaces, effective March 1, with headquarters at Du Bois, Pa.

F. O. Bonnell, engineer of tests for the Chicago, Rock Island & Pacific Railway Company at Chicago, has been appointed chief engineer of the Southern Car Wheel Company, Railway Exchange Building, St. Louis, Mo., effective March 1.

Judge J. E. Cooper has been elected a director of the New Britain Machine Company, New Britain, Conn., to succeed the late A. Howard Abbe.

Albert F. Rockwell was re-elected president of the Bristol Brass Company and the American Silver Company, Bristol, Conn., at the annual meetings of the two companies, Feb. 29. All the former directors and officers were also re-elected.

Benton Hopkins, representing the Samuel Austin & Son Company, Cleveland, Ohio, and the Morgan Engineering Company, Alliance, Ohio, sailed a few days ago for Russia in connection with the proposed building of a number of automobile plants. The plant immediately under construction is said to be the first of a group of 27 large self-contained plants of various kinds that are to be erected in Russia in the carrying out of a move-

ment to develop the country industrially, so that it will be as independent as possible from outside countries in the procuring of manufactured articles. The first plant will be used for the manufacture of automobiles and motor trucks.

J. E. Lawton, for the last nine years inspector and chief inspector of the Panama Canal, has resigned to accept a position as consulting engineer and sales manager for Ward & Co., manufacturers' agents, Washington, D. C.

Joseph P. Ripley, of the J. G. White Management Corporation, New York, has been appointed by the Secretary of the Treasury a member of a committee of six to promote trade relations between the United States and South American countries. He was graduated in 1912 from Cornell University as a mechanical engineer.

Alfred W. Dodd has been appointed eastern sales agent of the Granby Mining & Smelting Company, St. Louis, Mo., with offices at 165 Broadway, New York, succeeding the late Robert W. Conklin.

Enoch Trobeck, general European representative of the National-Acme Mfg. Company, Cleveland, Ohio, sailed for Europe, March 29.

Arthur P. Holloway, for the past seven years with the La Belle Iron Works, Steubenville, Ohio, first in the operating department and later in charge of the claims department, has accepted an appointment to the staff of the H. Koppers Company, Pittsburgh.

A. Van Zwaluwenburg, formerly of the editorial staff of the *Engineering and Mining Journal*, for the past five years engaged in metallurgical work in the City of Mexico, has returned to New York.

H. S. Williams, for several years connected with the Aluminum Castings Company, Cleveland, Ohio, is now purchasing agent for the Pittsburgh Model Engine Company, Pittsburgh.

W. W. Peacock, formerly in charge of the Pittsburgh office of Van Dyck, Churchill & Co., New York, is now associated with the Motch & Merryweather Machinery Company, Farmers Bank Building, Pittsburgh. Thomas H. Carlin, until recently connected with the Pittsburgh Screw & Bolt Company, Pittsburgh, is also in the Pittsburgh office of the same company, and E. C. Bachelor is in charge of the Pittsburgh office.

Bernard Lester has been appointed manager of the small-motor section of the industrial department of the Westinghouse Electric & Mfg. Company, East Pittsburgh.

Fred C. Easterly, formerly one of the assistant purchasing agents of the Westinghouse Electric & Mfg. Company, East Pittsburgh, has resigned to become traffic manager of the Ohio Iron & Metal Company, old material, Farmers Bank Building, Pittsburgh.

A. H. Otis, for the past five years manager of the Cleveland office of the Otis Elevator Company, has joined the Patterson-Leitch Company, Cleveland, and is vice-president. He will look after the new elevator gate department of the company's business.

A. G. Muhlhauser has been elected secretary of the D. T. Williams Valve Company, Cincinnati, Ohio, effective March 1.

F. Warren Marshall has taken over the interest of Howard C. Matlack in the firm of Marshall, Matlack & Co., iron merchants, and will continue the business under the name of F. W. Marshall & Co., 615 Pennsylvania Building, Philadelphia, Pa.

C. E. Stuart, secretary and treasurer, Central Steel Company, Massillon, Ohio, has been elected president of the Massillon Chamber of Commerce.

Paul M. Lincoln, for 23 years in the operating and engineering departments of the Westinghouse Electric & Mfg. Company, East Pittsburgh, is now connected with the sales department with the title of commercial engineer.

E. W. Pargny, president American Sheet & Tin Plate Company, Pittsburgh, who has been in Florida for about a month, is expected home this week.

Robert G. Nye has tendered his resignation as factory manager of the Buffalo Forge Company, Buffalo,

N. Y., to accept a similar position with the Alberger Pump & Condenser Company, of New York, with works at Newburgh, N. Y.

D. H. McDougall has been appointed general manager of the Dominion Steel Corporation, Sydney, N. S. He is a native of Nova Scotia and was attached to the engineering staff of the Dominion Iron & Steel Company in its construction period. He then spent two years in the study of mining and steel works engineering in the United States. Returning to Nova Scotia he was made superintendent of the iron-ore mining operations of the company.

P. R. Greist, Greist Mfg. Company, New Haven, Conn., has been elected president of the New Haven Branch, National Metal Trades Association, for the ensuing year. Other officers chosen were: C. G. Cook, Griswold Mfg. Company, vice-president; Henry Staby, William Schollhorn Company, treasurer. The executive committee is composed of F. D. Wanning, Birmingham Iron Foundry, Derby; G. A. Whitney, New Haven Clock Company; A. C. Gilbert, Mystic Mfg. Company, and C. M. Costello, C. Cowles & Co.

Stockholders of the Carroll Machine Company, Bucyrus, Ohio, at their recent annual meeting added two new directors, W. J. Mooney of Lima, Ohio, and C. F. Vollmer of Bucyrus. F. B. Donnenworth was elected president and general manager; O. L. Bradley, vice-president; C. F. Vollmer, secretary, and W. A. Blicke, treasurer.

OBITUARY

John C. Hooven

Col. John C. Hooven, president, Hooven, Owens, Rentschler Company, Hamilton, Ohio, died suddenly at his residence in that city March 1, aged 73 years. He was born in Montgomery County, Ohio, and moved to Hamilton in 1874, where he was associated with his father and brother in the agricultural implement business. Four years afterward he commenced the manufacture of portable engines and saw-mill machinery. In 1880 he was one of the principal organizers of the Hooven, Owens, Rentschler Company, and was elected president, a position he held at the time of his death. The company made a specialty of Corliss engines, of



J. C. HOOVEN

which he was the principal designer. He was also a director of the Hooven Writing Machine Company, the J. C. Hooven Company, the American Frog & Switch Company, the Dayton Rubber Company, and the Cincinnati, Lawrenceburg & Aurora Traction Company. He was a member of the Hamilton Club and other business and social organizations. He is survived by his widow, four sons and one daughter. All of his sons are connected with the company in some official capacity.

HARRY S. PELL, a prominent steam engineer, died March 1 at his home in Erie, Pa., from pneumonia, aged 71 years. He was born in Lykens, Dauphin County, Pa. As a boy of 16 he enlisted in the Twenty-sixth Pennsylvania Emergency Regiment, and participated in the battle of Gettysburg. He early developed a fondness for mechanics, and became an expert in water-tube boiler design. For many years he was associated with the Stirling Boiler Company and other leading manufacturers of water-tube boilers, and for the past few years was chief engineer of the water-tube boiler department of the Erie City Iron Works. He was a member of the American Society of Mechanical Engineers. He leaves his widow, three sons and a daughter. His sons are David W., Oswego, N. Y.; James B., Chicago, Ill., and Harry S., Jr., Erie. All are prominent business men, following the same or kindred lines of activity.

E. HOWARD SMITH, general manager of the Superior Supply Company, Bluefield, W. Va., died Feb. 25, aged 52 years. He was born in Richmond, Va., and was first employed by the Smith-Courtney Company of that city, and afterward was connected with the Miller Supply Company, Huntington, W. Va., with which concern he remained until he became general manager of the Superior Supply Company in 1904. This position he held until the time of his death. In addition he has been president of the Sterling Hardware Company, Bluefield, W. Va., for the past three years.

GEORGE W. K. TAYLOR, president McMann & Taylor Company, 104-106 John Street, New York, died suddenly March 5 at his home in Brooklyn, aged 60 years. He was born in Brooklyn and began his career with the Eaton, Cole & Burnham Company. In 1893 he became associated with Henry W. McMann and established the firm of McMann & Taylor, dealers in iron pipe, fittings and valves. He was a graduate of Cooper Union, a member of the Chamber of Commerce, Merchants' Association and Machinery Club, and a director of the Greenwich Bank.

GIDEON N. CALEB died from cancer March 2 in a hospital in New York City, aged 69 years. He was born in Delaware, served for a year in the Civil War, and was then for a time with the old Harlan & Hollingsworth Shipbuilding Company, Wilmington. Engaging in the life insurance business, he attained prominence, subsequently embarking in manufacturing lines connected with the steel trade. He retired about three years ago.

JOHN J. YOUNG, secretary of the Pacific Foundry Company, and for three years president of the California Foundrymen's Association, died Feb. 28 from heart trouble at St. Francis Hospital, San Francisco. He leaves his widow and a daughter. The foundries of San Francisco were closed on the afternoon of March 2 when the funeral services were held.

EDWARD T. BETTS, vice-president and treasurer of the Betts Machine Company, Wilmington, Del., died Feb. 27, aged 60 years. He was also a manager of the Wilmington Savings Fund Society and a director of the Wilmington Trust Company.

EDWARD ROWLAND, president William & Harvey Rowland Company, manufacturer of vehicle springs, Frankford, Philadelphia, died at his home in Chestnut Hill, March 1, from heart disease, aged 71 years. He was born in Philadelphia.

The California Industrial Accident Commission has established a museum of safety appliances at 529 Market Street, San Francisco.

Iron and Steel Markets

NEW OUTPUT RECORDS

Both by Blast Furnaces and Steel Mills

Pig-Iron Buying Heavy at Rising Prices—Billets Close to a Finished Steel Basis

Shipments from mills were very heavy in February and some of the latter, notably those of the largest Chicago district producer, broke all records. In the Pittsburgh district the mills are working as never before to reduce piled-up orders, and some are succeeding. Generally, however, and partly due to embargoes, the month left producers farther behind in deliveries.

Reports of embargoes and car shortages show that the railroads are getting deeper in the mire and that situation, with the added threat of strikes, is giving shippers no little concern.

In districts east of Chicago the scarcity of plates, shapes and bars is bearing most heavily on manufacturing consumers, since producers nearest the seaboard were first swept off their feet by war demand. Thus it happens that while Western buyers are covered for most of the year, many dependent on Pittsburgh and other Pennsylvania mills cannot get the latter to enter their orders for the second half. One reason is that buyers, instead of specifying about two-thirds of the maximum figures in contracts, have gone to the limit and many mills are thus so oversold that, without formally opening their books for the last half, they will be at work far into the third quarter on what is called first half business.

Considering the close connection some furnaces have made on coke shipments, the February pig-iron output was surprising. The total of 3,087,212 tons for 29 days or 106,456 tons a day compares with 3,185,121 tons in January, or 102,746 tons a day. There was a net gain of six in active furnaces and the 312 furnaces in blast March 1 represent 107,510 tons a day as against 106,372 tons for 306 furnaces on Feb. 1. Production is now proceeding at the unprecedented rate of 39,500,000 tons a year.

An index to the remarkable scale of blast furnace operations are the iron-ore stocks at Lake Erie docks—only 6,200,000 tons on March 1 against 7,500,000 tons a year previous. Ore shippers, realizing the enormous strain of the coming season, are planning to break the ice in the channel at Escanaba, the Michigan port, before the end of March, to make a new record in the opening of the shipping season.

There has been another week of heavy pig-iron selling in all markets outside of the East. Prices of Northern iron have moved up at Chicago, Cincinnati and Cleveland, and buying of Southern iron has been enough to make \$15.50 nearly as common as \$15, Birmingham, on early deliveries, and one producer, after selling 50,000 tons, is holding for \$16. Southern warrants are still selling at \$14 and \$14.25, however, and Northern resale iron has gone at considerably less than Buffalo furnace prices.

Pittsburgh sales include 35,000 tons of basic at \$18 to \$18.40 at furnace, 30,000 to 35,000 tons of foundry iron and 10,000 tons or more of Bessemer. Inquiries for Bessemer iron are large, and one interest is reported to be in the market for 80,000 tons for the last half.

Following the taking up of 100,000 tons of heavy melting scrap at Pittsburgh and Chicago last week the Steel Corporation has bought 50,000 tons for Gary, and there has been important buying of such material at Chicago for shipment to Pittsburgh at \$18 to \$18.50, delivered.

Ferromanganese has sold at \$175 for 1917, the only delivery British producers now promise on new contracts. Small lots have sold as high as \$300, or nearly \$4 per unit.

Semi-finished steel is steadily advancing and has sold for early shipment at higher than contract prices for finished material. For 4000 tons of open-hearth billets \$42 was paid at Cleveland. Eastern producers have opened their books for the third quarter at \$50. A sale of 3000 tons of forging billets in eastern Pennsylvania at \$85 represents the imperative nature of some recent locomotive requirements.

Structural work is assuming larger proportions as spring comes on. In the West some wide ranges have been shown in recent bids of fabricators—as much as \$28 a ton on one contract last week.

Agents of the Allies are more actively pressing for shell steel for the late months of the year. At Cleveland an inquiry has come out for 25,000 tons of billets for high explosive shells.

In Ohio some implement bar contracts for the last half have been closed at 2.25c., Pittsburgh, and structural steel and bars for specific work in the hands of manufacturers have been booked for that delivery at 2.35c. and 2.40c., Pittsburgh. Central Western sales of plates for future delivery have been made at 2.60c. and for early shipment at 2.75c. and 3c.

Chicago

CHICAGO, ILL., March 8, 1916.—(By Wire.)

The apparent supply of scrap is so completely determined by prices and the conditions of the market that it is seldom an index of the real supply—itself a variable of uncertain limits. But in the continuing efforts of a large interest to secure heavy melting and shoveling steel, and in the scramble of traders to cover short sales, there have been in the past week evidences that the immediate unusual demand will be satisfied with difficulty—regardless of price. The market, however, is moving up at a rate unlikely to be sustained by the average consumptive requirements over a period. Scarcely less activity engages those interested in pig iron. Under the impetus of solicitation on the basis of \$15, Birmingham, for last half, buying of Southern iron in round lots of 1000 to 5000 tons has been added to liberal purchases of Northern foundry, malleable and basic iron, and a temporary disposition on the part of some furnaces to encourage buying has been followed by renewed firmness and even higher prices. That the

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Mar. 8.	Mar. 1.	Feb. 9.	Mar. 10.
Pig Iron, Per Gross Ton:	1916.	1916.	1916.	1915.
No. 2 X, Philadelphia...	\$20.00	\$20.00	\$20.00	\$14.25
No. 2, Valley furnace...	18.50	18.50	18.25	13.00
No. 2, Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala...	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	18.50	18.50	18.50	12.75
Basic, de'd, eastern Pa...	19.50	19.50	19.50	13.50
Basic, Valley furnace....	18.25	18.00	17.50	12.50
Bessemer, Pittsburgh...	21.45	21.45	21.45	14.55
Malleable Bes., Ch'go*	19.50	19.00	19.00	13.00
Gray forge, Pittsburgh...	18.45	18.45	18.45	13.45
L. S. charcoal, Chicago...	19.75	19.75	19.75	15.75

Billets, etc. Per Gross Ton:

Bess. billets, Pittsburgh...	40.00	37.00	33.00	19.50
O-h. billets, Pittsburgh...	40.00	38.00	35.00	19.50
O-h. sheet bars, P'gh...	41.00	38.00	35.00	20.50
Forging billets, base, P'gh...	60.00	55.00	55.00	24.00
O-h. billets, Phila.....	50.00	42.00	42.00	21.52
Wire rods, Pittsburgh...	55.00	50.00	47.00	25.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	2.559	2.559	2.409	1.15
Iron bars, Pittsburgh...	2.35	2.35	2.15	1.10
Iron bars, Chicago.....	2.15	2.00	1.90	1.10
Steel bars, Pittsburgh...	2.50	2.50	2.25	1.15
Steel bars, New York...	2.669	2.669	2.419	1.319
Tank plates, Pittsburgh...	2.75	2.75	2.50	1.10
Tank plates, New York...	3.169	3.169	2.669	1.269
Beams, etc., Pittsburgh...	2.25	2.25	2.00	1.15
Beams, etc., New York...	2.419	2.419	2.189	1.319
Sleip, grooved steel, P'gh...	2.20	2.10	1.90	1.10
Sleip, sheared steel, P'gh...	2.30	2.20	2.00	1.15
Steel hoops, Pittsburgh...	2.50	2.50	2.25	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

railroads have become solicitous concerning their requirements of rails and track fastenings for an extended future period is more apparent, and inquiry for 1917 rails, spikes and bolts is general. As yet but little of such business has been placed. Local mills still have some Bessemer rails to offer in the last half of this year and one road took 6000 tons last week. The securing of 3000 tons of open-hearth rails by another road, to be rolled immediately, is an interesting exception. The buying of iron tie-plates is still a feature, one road having increased its purchases to 1,000,000 pieces. In connection with structural business, the widely variant policies of fabricators is illustrated by a range of \$28 per ton between the maximum and minimum quotations brought out in the placing of 750 tons by the Great Northern Railroad, while the taking of 2000 tons for the Milwaukee Athletic Club contrasts with refusals to quote on another inquiry involving 3000 tons, the amount being considered too large to be desirable. Bar iron has been advanced to 2.25c., Chicago, for second quarter, and track bolts are now held at a minimum of 3.25c.

Pig Iron.—Activity in pig iron has been rounded out into a general buying movement. The appearance of quotations equivalent to \$15, Birmingham, for Southern iron, for full last half delivery, encouraged a buying which has run into a large total, in lots of 500 to 5000 tons, and has restored the Southern position to a firm basis of \$15.50, with \$16 an impending minimum. Selling of Northern iron has been of like character as to volume and malleable has been advanced by at least one interest to \$19.50, Chicago furnace. A sale of 4000 tons of basic at \$19, f.o.b. furnace, brings that grade of iron up to the level of No. 2 foundry. But the strength of the furnace position is still undermined in no small degree by the offerings of resale and warrant iron. The appearance of iron of this character is unexpectedly persistent, and quotations for Southern iron in particular, including prices as low as \$14.25 for No. 2 fracture grading and \$14.50 and \$14.75 for No. 2 analysis, are doubtless effective in retarding the upward movement of furnace quotations. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron,

	Mar. 8.	Mar. 1.	Feb. 9.	Mar. 10.
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:				
Sheets, black, No. 28, P'gh...	2.75	2.60	2.60	1.80
Galv. sheets, No. 28, P'gh...	4.75	4.75	4.75	3.40
Wire nails, Pittsburgh...	2.40	2.40	2.20	1.60
Cut nails, Pittsburgh...	2.30	2.30	2.10	1.55
Fence wire, base, P'gh...	2.25	2.25	2.05	1.40
Barb wire, galv., P'gh...	3.25	3.25	3.05	2.10

Old Material, Per Gross Ton:

	1916.	1916.	1916.	1915.
Iron rails, Chicago.....	18.00	17.25	17.25	12.00
Iron rails, Philadelphia...	19.50	19.50	19.50	13.00
Carwheels, Chicago.....	14.50	13.50	13.75	10.00
Carwheels, Philadelphia...	16.50	16.50	16.50	11.00
Heavy steel scrap, P'gh...	18.00	17.75	17.00	12.00
Heavy steel scrap, Phila...	16.50	16.50	16.50	10.50
Heavy steel scrap, Ch'go...	16.50	15.75	14.75	9.75
No. 1 cast, Pittsburgh...	16.00	15.75	15.75	11.25
No. 1 cast, Philadelphia...	17.00	17.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	13.50	13.25	12.75	9.00

Coke, Connellsville,

Per Net Ton at Oven:	\$3.75	\$3.50	\$3.50	\$1.15
Furnace coke, prompt...	2.85	2.50	2.50	1.65
Foundry coke, prompt...	3.75	3.75	3.50	2.00
Foundry coke, future...	3.50	3.50	3.25	2.15

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	27.00	27.37½	26.50	15.25
Electrolytic copper, N. Y...	26.50	27.12½	26.37½	14.75
Spelter, St. Louis.....	19.00	20.50	19.00	11.00
Spelter, New York.....	19.25	20.75	19.25	11.25
Lead, St. Louis.....	6.70	6.30	6.00	3.87½
Lead, New York.....	6.70	6.30	6.10	3.95
Tin, New York.....	49.00	48.00	41.12½	47.00
Antimony, Asiatic, N. Y...	44.00	44.00	43.50	20.50
Tin plate, 100-lb. box, P'gh...	\$4.00	\$4.00	\$4.00	\$3.20

which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch.....	20.75
Northern coke foundry, No. 1.....	19.00
Northern coke foundry, No. 2.....	18.50
Northern coke foundry, No. 3.....	18.00
Southern coke, No. 1 f'dry and 1 soft.	\$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft.	19.00 to 19.50
Malleable Bessemer.....	19.50
Basic.....	19.00
Low phosphorus.....	34.00 to 36.00
Silvery, 8 per cent.....	29.50
Bessemer ferrosilicon, 10 per cent.....	33.50

(By Mail)

Rails and Track Supplies.—The railroads are indicating their concern in the matter of rail requirements in an unmistakable way and inquiry for 1917 delivery covers a representative tonnage. But the placing of contracts for exclusively 1917 shipment with local mills is as yet very limited. Inquiry for additional rails for the present year embraces an aggregate of some size, consisting of a number of small lots, of which the largest are the Russian inquiry for about 8000 tons of light sections and the Alaskan inquiry for 15,000 tons. The Kansas City Southern Railway has just bought 6000 tons of Bessemer rails and the Chicago, Milwaukee & St. Paul 3000 tons of open-hearth which a mill east of here is able to roll for immediate delivery. Inquiry for 1917 rails includes track fastenings. In one instance, a purchase of 600,000 iron tie-plates, added to a purchase of 300,000 by the same road in the preceding week, will cover the requirements of the purchaser through the first half of 1917. The sold-up condition of the makers of steel tie-plates is greatly increasing the sale of iron plates, and local mills are booked into the third quarter. The minimum price of track bolts has been advanced to 3.25c., Chicago. We quote standard railroad spikes at 2.60c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie plates, \$45, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.61c.; 16 to 20 lb., 1.66c.; 12 lb., 1.71c.; 8 lb., 1.76c.; angle bars, 1.50c. to 1.75c., Chicago.

Structural Material.—Eight contracts for fabricated steel reported as taken last week call for a total of a little over 5000 tons, of which 2000 tons will be fur-

nished by the Worden-Allen Company for the Milwaukee Athletic Club. The Great Northern Railroad closed its inquiry for girder spans calling for about 750 tons. Quotations on this job showed a maximum variation of about \$28. The Minneapolis Steel & Machinery Company took one contract of 300 tons and another of 245 tons for Pacific coast work. The Chicago, Burlington & Quincy has not yet placed the bridge work for which it has been in the market. But little headway is made in reducing the number of cars outstanding for which prices are being asked. The Chicago & Northwestern has closed for 1500 with the Western Steel Car & Foundry Company, the Burlington is in the market for a like number and the Northern Pacific for 1000. The prevailing limitation of structural business to small tonnages illustrates the attitude of most of the fabricators, an attitude unfavorable to the work requiring a considerable amount of steel. Inquiry for certain work requiring from 2000 to 3000 tons has brought out refusals to quote, whereas under normal circumstances work of a similar character would develop the keenest competition. Most of the fabricators in this district having contracts for raw material to cover their normal requirements are disposed to make that tonnage yield the greatest profit through the medium of a large number of small jobs. We quote for Chicago delivery of plain material from mill 2.439c.

We quote for Chicago delivery of structural steel from store 2.90c.

Plates.—Each week brings out new phases of the scramble for plates, although this market does not compare in that respect with the East. We quote for Chicago delivery of plates from mill on contracts, 2.539c., and for prompt shipment, 3.189c.

We quote for plates out of Chicago stock 3.15c.

Rivets and Bolts.—Both the manufacturing trade and the railroads, the latter particularly, are putting out liberal inquiries for bolts and nuts. Contracts previously considered ample in their provisions are being extended at the higher prices. Sales of rivets in carloads last week were made in several instances at 3.15c., Chicago. We quote as follows: Carriage bolts up to $\frac{3}{8}$ x 6 in., rolled thread, 65-5; cut thread, 65; larger sizes, 50-15; machine bolts up to $\frac{3}{8}$ x 4 in., rolled thread, with hot pressed square nuts, 65-10; cut thread, 65-5; larger sizes, 50-20; gimlet point coach screws, 65-10-5; hot pressed nuts, square, \$3.70 off per 100 lb.; hexagon, \$3.80 off. Structural rivets, $\frac{3}{8}$ to $1\frac{1}{4}$ in., 3.15c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote prices, out of store: Structural rivets, 3.25c.; boiler rivets, 3.35c.; machine bolts up to $\frac{3}{8}$ x 4 in., 70-12 $\frac{1}{2}$; larger sizes, 65-10; carriage bolts up to $\frac{3}{8}$ x 6 in., 70-5; larger sizes, 65- off; hot pressed nuts, square, \$4.50, and hexagon, \$4.70 off per 100 lb.; lag screws, 75.

Sheets.—There is but a limited demand for black sheets. While some makers are quoting 3.20c., Pittsburgh, for No. 28, those who have box annealed sheets to sell are shading 2.75c. Special finish sheets are being sought eagerly by automobile manufacturers and the demand for blue annealed is unabated, one inquiry for 3000 tons being noted. New transactions in galvanized sheets have been reduced to a negligible tonnage. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.939c.; No. 28 black, 2.889c.; No. 28 galvanized, 5c.

We quote for Chicago delivery from jobbers' stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.10c.; No. 28 black, 3c. to 3.10c.; galvanized, 22 gage and lighter, on the basis of 5.15c.; 5.25c. for No. 28; 20 gage and heavier, on the basis of 4.80c. to 4.90c. for No. 28, the usual differentials obtaining.

Bars.—Sales of high-carbon bars at 2.25c., for reinforced concrete construction, and of mild steel at 2.75c., f.o.b. mill, are instances of transactions involving materials, the pressing need of which sets prices at naught. The call for steel bars, even where prices are not prohibitive, goes begging because of impossible deliveries, and an increasing tonnage is going into iron. Bar-iron mill schedules have been filling up more rapidly and deliveries within four weeks are now available only for exceptional sizes. Minimum prices for bar iron have been advanced \$3 per ton. We quote mill shipments, Chicago, as follows: Bar iron, 2.15c. to 2.25c.; soft

steel bars, 2.439c. to 2.50c.; hard steel bars, 2.25c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 2.90c.; bar iron, 2.90c.; reinforcing bars, 2.90c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

Wire Products.—The further advance of \$2 per ton in the prices of wire products, with an equivalent advance in fencing, changes the general situation very little, except that, as the mill prices grow more extreme, the retailer finds himself better able to secure corresponding advances on his sales. Resumption of inquiry for export wire calls for consideration of new large tonnages, particularly of barb wire. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$2.439; wire nails, \$2.589; painted barb wire, \$2.739; galvanized barb wire, \$3.439; polished staples, \$2.739; galvanized staples, \$3.439, all Chicago.

Cast-Iron Pipe.—The 5500 tons for the city of Detroit has been placed with the Detroit shop of the American Car & Foundry Company, and at Cincinnati, Ohio, 2650 tons will be furnished by the United States Cast Iron Pipe & Foundry Company. The American Cast Iron Pipe Company will make 1800 tons for Columbus, Ohio. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$32.50 to \$33; 6 in. and larger, \$29.50 to \$30, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The usual aftermath of heavy sales of scrap to consumers, a period in which the dealers are endeavoring to cover their sales, is again the experience of this market. In the process of gathering up available material from every source, values have been forced 25c. and 50c. above the level at which the consumer transactions were made, a differential not entirely covered by the spread in our quotations. There are many evidences of difficulty in covering short sales, particularly of heavy melting steel, the Illinois Steel Company alone, including its purchase last week, having taken approximately 100,000 tons, and for the present, at least, a real shortage of scrap, as distinguished from the not infrequent apparent shortages, is to be reckoned with. A purchase of 3000 tons of carwheels has been made by a manufacturing interest, the wheels, as scrap, being cheaper than pig iron and more plentiful than other forms of scrap ordinarily used but which have found a higher market now, as heavy melting steel. For the time, local consuming demand for heavy melting and wrought scrap appears to have been satisfied. Railroad offerings of old material do not greatly relieve the dealers' situation, the tonnage being comparatively small. The St. Paul has 2300 tons, the Chicago & Alton 1200 tons, the Chicago Great Western 500 tons, the Pere Marquette 500 tons and the Pennsylvania Lines a list of approximately normal size. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	\$18.00 to \$18.50
Relaying rails	19.50 to 20.50
Old carwheels	14.50 to 15.00
Old steel rails, rerolling	17.25 to 17.75
Old steel rails, less than 3 ft.	16.75 to 17.00
Heavy melting steel scrap	16.50 to 17.00
Frogs, switches and guards, cut apart	16.50 to 17.00
Shoveling steel	16.25 to 16.75
Steel axle turnings	12.25 to 12.75

	Per Net Ton
Iron angles and splice bars	\$17.50 to \$18.00
Iron arch bars and transoms	18.75 to 19.25
Steel angle bars	15.50 to 15.75
Iron car axles	20.00 to 20.50
Steel car axles	24.00 to 24.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	14.75 to 15.25
Cut forge	14.75 to 15.25
No. 1 busheling	12.75 to 13.25
No. 2 busheling	9.25 to 9.75
Pipes and flues	11.00 to 11.50
Steel knuckles and couplers	15.25 to 15.75
Steel springs	15.50 to 16.00
No. 1 boilers, cut to sheets and rings	11.25 to 11.50
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	17.00 to 17.50
Machine shop turnings	8.25 to 8.50
Cast borings	7.50 to 7.75
No. 1 cast scrap	13.50 to 14.00
Stove plate and light cast scrap	11.25 to 11.75
Grate bars	11.00 to 11.25
Brake shoes	10.75 to 11.00
Railroad malleable	14.00 to 14.50
Agricultural malleable	11.75 to 12.25

Philadelphia

PHILADELPHIA, PA., March 7, 1916.

The market shows little or no change in the general run of finished steel products. No let-up in demand is the general verdict with regard to plates, shapes and bars. A maker of billets has opened his books for the third quarter at \$50 for open-hearth rerolling billets, and \$55 to \$65 for forging steel. A locomotive company is reported to have paid \$85 for 3000 tons of axle billets. Blue annealed sheets are stronger, with the makers unwilling to sell far ahead. Small and medium-sized lots of foundry pig iron are active and the market in general is strong, with sellers in an optimistic mood. Spot furnace coke is in active demand, sales having been made at \$3.65 at oven to consumers who are faced by a shortage because of the railroad freight situation. Ferromanganese and spiegel-eisen are scarce and obtained with difficulty at any price. Old material quotations are unchanged, although the large buying in the West has improved sentiment.

Pig Iron.—No large sales or inquiries are noted, but a steady business is being done in small or medium-sized lots of foundry iron at prices that are firmly held by most of the producers. It is extremely probable that some round lots for last half delivery have been negotiated which both sellers and buyers have agreed not to mention. Although the volume of sales does not appear to show any increase, the attitude of the producers is one of cheerfulness. The reports of their salesmen show that practically all foundries are busy, and many of them have not covered for the third quarter and last half. It is again suggested that a shortage of pig iron is possible in the not distant future. The railroad freight situation is more acute, and, because of the embargoes, furnaces are piling iron rapidly. In some instances consumers are begging for iron, asking that deliveries be bunched instead of being extended over the customary period, in this manner making up for the temporary holding up of shipments from other directions. Others are protesting against their inability to get any iron whatever. On only five or six days out of a month has the Pennsylvania Railroad accepted shipments for delivery in New England. Basic has been quiet since the recent sale of a few thousand tons to a consumer at Trenton, N. J. A few thousand tons of standard low phosphorus have been taken for last half delivery at slightly over \$32, delivered. Several eastern Pennsylvania makers are quoting \$20, furnace, for No. 2 X, and others quote \$20, delivered, but less than the latter price has been accepted in preference to letting business get away. A lot of gray forge was taken at \$19, furnace. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry.....	\$19.75 to \$20.75
Eastern Pa., No. 2 plain.....	19.50 to 20.50
Virginia, No. 2 X foundry.....	20.75
Virginia, No. 2 plain.....	20.25
Gray forge	19.00 to 19.50
Basic	19.50 to 20.00
Standard low phosphorus	32.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended March 4 comprised 3700 tons from Chile and 4700 tons from Cuba.

Ferroalloys.—The quotation for forward deliveries of 80 per cent ferromanganese has been advanced to \$175, but the agents of the English producers have little to sell at any price. Inquiry is heavy, some consumers endeavoring to buy into next year. Spot ferromanganese is extremely scarce, and consumers are said to be willing to pay \$300, which does not seem unreasonable in view of \$4 per unit having been paid for 50 per cent material. Spiegel-eisen is as scarce as ferromanganese, but the quotation for 20 per cent is unchanged at \$50, furnace. Bessemer ferrosilicon is quoted at \$35.44, Philadelphia. Fifty per cent ferrosilicon ranges from \$83 to \$85, Pittsburgh, according to quantity.

Plates.—The scarcity of prompt material and the high prices are bearing heavily on the small consumers of plates. The minimum quotation of the leading mills is 3.25c., Pittsburgh, or 3.409c., Philadelphia, and sev-

eral hundred tons have been taken at 3.659c., Philadelphia. Predictions of still higher prices are heard. With one leading mill deliveries are six months away, although somewhat better can be done with universal rolled plates. Inquiry for ship plates is being made by a projected shipbuilding company at Gloucester, N. J., on the Delaware River.

Bars.—The situation in steel bars is unchanged, and the nominal quotation remains at 2.409c., Philadelphia. Iron bars are strong at 2.559c., Philadelphia, and makers are fighting off some of the business offered to them.

Structural Material.—Makers find no let-up in the demand, and their minimum quotation is unchanged at 2.409c., Philadelphia, but they quote up to 2.50c., Eastern mill, according to the location of the buyer. New building propositions in this territory are few. Irwin & Leighton, of this city, have the general contract for a building for the Victor Talking Machine Company, Camden, N. J. The Eastern Steel Company will supply the material required, between 400 and 500 tons. The Pennsylvania Steel Company will furnish 130 tons for a Philadelphia & Reading Railroad bridge in this city. The Lenoir Car Works has not yet purchased the shapes and plates it inquired for recently, and is still in the market, although it has reduced the tonnage, now asking quotations on about 3000 tons of shapes and 5000 tons of plates.

Billets.—An eastern Pennsylvania maker of billets has opened his books for the third quarter to some customers. He has obtained \$65 for forging billets, quotations for which run from \$55 to \$65 according to specifications. Open-hearth rerolling billets are quoted at \$50. A lot of 3000 tons of axle billets is reported to have been taken by a locomotive company at \$85. Prompt billets continue difficult to obtain, as the prices indicate.

Sheets.—For No. 10 blue annealed, 3.409c., Philadelphia, is quoted, with the makers as yet unwilling to sell into the third quarter.

Coke.—Some good-sized tonnages of spot furnace coke have been taken at \$3.65 per net ton at oven and the price may be said to range from \$3.50 to \$3.75. Delayed shipments have made consumers more active. Contract furnace coke ranges from \$2.50 to \$3. Contract foundry ranges from \$3.50 to \$4, and spot, \$4 to \$4.50. Freight rates from the principal producing districts follow: Connellsburg, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—Quotations are unchanged, but the sentiment is better because of the large purchases made at Pittsburgh which served to strengthen the grades which were weakest here. Large quantities of borings and turnings are being shipped to Johnstown, Pa., for blast-furnace use. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$16.50 to \$17.00
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap.....	21.50 to 22.50
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	19.50 to 20.00
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	21.50 to 22.00
Wrought-iron pipe	14.75 to 15.25
No. 1 forge fire	14.00 to 14.50
Bundled sheets	14.00 to 14.50
No. 2 busheling	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Cast borings	11.00 to 11.50
No. 1 cast	17.00 to 18.00
Grate bars, railroad	12.50 to 13.00
Stove plate	13.00 to 13.50
Railroad malleable	15.00 to 15.50

A recent newspaper dispatch stated that the Pennsylvania Steel Company, the Harrisburg Pipe & Pipe Bending Company and the Central Iron & Steel Company in the Harrisburg, Pa., district, had issued orders which will require their employees to be total abstainers. The statement is incorrect. All the companies named are naturally discouraging drinking among their employees, and where it has interfered with their work have dispensed with the services of men so offending. Regulations forbidding the bringing of liquor into plants are enforced by a number of steel companies.

Cleveland

CLEVELAND, OHIO, March 7, 1916.

Iron Ore.—The amount of ore on Lake Erie docks is being reduced rapidly. Ore shipments from the docks in February amounted to 860,266 tons as compared with 301,629 tons in the same month a year ago. On March 1 there was 6,213,739 tons on the docks as compared with 7,509,587 tons on the same date a year ago, with 7,743,290 tons on the docks the same date in 1914, and 7,775,885 tons on the docks the same date in 1913. March shipments are expected to be large, so that at the opening of navigation there will be much less ore on the docks than on the same date in many previous years. Ore stocks of some of the consumers are getting rather low and these are anxious that the shipping season open as soon as possible. A movement is now on foot among shippers and vessel owners to break open the channel at Escanaba soon after March 20 in order to start shipments from that port as early as possible. If this plan is carried out some ore may be shipped before April 1. The market shows a little more activity than at any time since the heavy buying movement. One shipper reports sales during the week aggregating 85,000 tons and several small sales have been made by others. The buyers are furnace interests who did not originally cover for all their requirements. We quote prices as follows, delivered at lower lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—The market continues very active. The heavy buying movement which started over a week ago has subsided only slightly. During the past week there has been a large tonnage of foundry iron sold in this city and surrounding northern Ohio territory and local selling agents are booking a large amount of business in other districts. Some of the orders placed have been for second quarter, but buying for the most part is for last half in lots up to 5000 tons. Prices are very firm, with quotations unchanged. The Cleveland market is established at \$19 for No. 2 delivered and \$18.50 at furnace for outside shipment. The Valley price is firm at \$18.50. In steel-making iron we note the sale of 5000 tons of basic iron for shipment east on the basis of \$18.40, Valley furnace. Southern iron is quite active. Several sales of 1000-ton lots were made during the week as well as a number of smaller lots. While the general quotation is \$15.50, Birmingham, for second quarter and \$16 for last half, 1000-ton lot sales for the last half delivery were made at \$15.50. Ohio silvery iron is very firm at the recent advance to \$27 at furnace for 8 per cent. We quote, delivered Cleveland, as follows:

Bessemer	\$20.95 to \$21.45
Basic	18.90 to 19.00
Northern No. 2 foundry	19.00
Southern No. 2 foundry	19.50 to 20.00
Gray forge	18.45
Jackson Co. silvery 8 per cent silicon	28.62
Standard low phosphorus, Valley furnace	32.00

Coke.—The market is quiet. Some foundry coke business is being booked at \$3.50 to \$4 per net ton at oven for last half and carload lot sales for prompt shipment are being made as high as \$5, although some makes can be had around \$4. Furnace coke for prompt shipment is quoted at \$3.75.

Finished Iron and Steel.—The demand for contract steel for specific work continues active, but most of the mills are declining to quote prices. The implement trade in this territory is being covered with last half contracts for steel bars at 2.25c. Quotations for the fourth quarter outside of the implement trade and for specific work range from 2.35c. to 2.40c. for steel bars and structural material. The firmness of the steel-bar market is indicated by the turning down by a Youngstown mill of an offer of 2.50c. for a round lot of bars for last half delivery. Plates are quoted around 2.60c., Pittsburgh, for future delivery and 2.75c. to 3c. for prompt shipment. Lake shipbuilders are figuring on two boats that will require 4000 tons of steel. We note the sale by a Youngstown mill of 3000 tons of sheet

bars for delivery in the Cleveland territory prior to June 1 at \$39. Several carloads of open-hearth billets, which a Youngstown mill was unable to ship East because of the embargo, were sold in Cleveland last week at \$42 to \$45. Forging billets are being quoted as high as \$65. Among new inquiries is one for 25,000 tons of billets for high-explosive shells. Considerable structural work continues to come out in spite of the high prices. The American Bridge Company has taken about 1500 tons for an extension to the plant of the Firestone Tire & Rubber Company, Akron, Ohio. The Massillon Bridge & Structural Company has taken 320 tons for the Campbell office building in Erie, Pa. An inquiry is out for 700 tons of structural material and 1000 tons of reinforcing bars for a building for the plant of the General Electric Company at Fort Wayne, Ind. Hard steel bars have become very scarce, and the latest local quotation was 2.50c., Pittsburgh. Iron bars are in fair demand with quotations unchanged at 2.25c. to 2.35c., Cleveland. Shafting prices have advanced to 30 per cent off for carloads and 25 per cent for less than carloads. The Northern Ohio Traction & Light Company has placed orders for 10,000 steel ties. The demand for sheets continues heavy, and several of the Ohio mills are out of the market on all grades of either box annealed or blue annealed. We quote black sheets at 2.75c., Ohio mill, for No. 28; blue annealed, 2.90c. to 3c. for No. 10; galvanized sheets, 5c. for No. 28. The warehouse price on flat steel bars over 1 in. in size has been advanced to 3.50c., or the same price as 2-in. rounds. Other warehouse prices are unchanged at 3c. for steel bars and 3.15c. for plates and structural material.

Bolts, Nuts and Rivets.—A further advance in bolt and nut prices is expected within a few days, as these prices have not been put up since the last advance in the steel-bar prices. The demand continues active. Makers are closing contracts for second quarter but are generally avoiding selling beyond July 1. Rivets are unchanged at 3c., Pittsburgh, for structural and 3.10c. for boiler rivets for carload lots. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 65 & 5; cut thread, 65; larger or longer, 50 & 15; machine bolts with h.p. nuts, $\frac{3}{8}$ x 4 in., smaller and shorter, rolled thread, 65 & 10; cut thread, 65 & 5; larger and longer, 50 & 20; lag bolts, gimlet or cone point, 65, 10 & 5; square h.p. nuts, blank or tapped, \$3.70 off the list; hexagon, h.p. nuts, blank or tapped, \$3.80 off; c.p.c. & t. square nuts, blank or tapped, \$3.50 off; hexagon nuts, all sizes, \$4.25 off; cold pressed semi-finished hexagon nuts, all sizes, 75 & 10 off.

Old Material.—Producers and dealers are holding their scrap for an expected advance and no sales are reported except in small lots. Inquiries for round lots would doubtless force prices up considerably. Cleveland mills are not actively in the market, but are taking scrap as it is offered. Canton and Portsmouth are in the market, but Youngstown is quiet. The market is very firm, being influenced by further buying by the Carnegie Steel Company in Pittsburgh the past week. Prices on some grades are higher, including heavy steel, busheling and turnings. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton
Old steel rails
Old iron rails
Steel car axles
Heavy melting steel
Old carwheels
Relaying rails, 50 lb. and over
Agricultural malleable
Railroad malleable
Steel axle turnings
Light bundled sheet scrap

Per Net Ton
Iron car axles
Cast borings
Iron and steel turnings and drillings
No. 1 busheling
No. 1 railroad wrought
No. 1 cast
Railroad grate bars
Stove plate

The Electric Steel Castings Company, Milwaukee, reference to whose plans for the erection of a foundry for the exclusive production of electric steel castings has already been made, has contracted for the installation of a 6-ton Heroult furnace.

Cincinnati

CINCINNATI, OHIO, March 8, 1916.—(By Wire.)

Pig Iron.—Heavy sales have been made the past week, with basic and malleable leading, although both Southern and Northern foundry grades were bought quite freely in Michigan, Indiana and central Ohio. Local foundry melters previously bought enough iron to run them through the year, with but few exceptions. A basic consumer in this territory contracted for approximately 15,000 tons for last half shipment, apportioned between Northern and Southern producers. Malleable sales reported include 4000 tons to an Indiana melter and 2000 tons to a Michigan consumer, both for last half shipment. An Indiana manufacturer bought 600 tons of Lake Superior charcoal and another firm in the same vicinity took 500 tons each of Northern and Southern foundry. Virginia iron makers have lately sold quite a large tonnage in this territory, included in which are two sales in Michigan of 1000 and 1200 tons respectively and a 1000-ton lot to an Indiana purchaser, while many smaller lots were taken for last half movement. Two central Ohio firms bought 500 tons each of Northern foundry, and other like tonnages of Southern foundry were bought by different melters in southern Ohio and Indiana. Southern No. 2 foundry is quoted at \$15 to \$15.50 for first half shipment and around \$15.50 to \$16 for last half delivery. Only a few small contracts have been made at \$16, Birmingham basis, for last half shipment. The silvery irons are firm at \$27, furnace, although only a few contracts were made last week. Northern basic, malleable and No. 2 foundry asking prices were advanced on Monday to \$19, Ironton, for this year's shipment. As the furnaces in that district have booked some time ahead, this will probably soon be established as the minimum price. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft.	17.90 to 18.40
Southern coke, No. 3 foundry.	17.40 to 17.90
Southern No. 4 foundry.	16.90 to 17.40
Southern gray forge.	16.40 to 16.90
Ohio silvery, 8 per cent silicon.	28.26 to 28.76
Southern Ohio coke, No. 1.	20.76 to 21.26
Southern Ohio coke, No. 2.	19.76 to 20.26
Southern Ohio coke, No. 3.	19.26 to 19.76
Southern Ohio malleable Bessemer.	19.76 to 20.26
Basic, Northern.	19.76 to 20.26
Lake Superior charcoal.	21.20 to 22.20
Standard Southern carwheel.	25.40 to 25.90

(By Mail)

Coke.—A considerable number of foundry coke contracts have been made for a year's supply, with shipments beginning July 1. In this immediate vicinity many buyers have not yet covered for their future wants. Contract figures are very strong and we quote Connellsville 72-hr. coke at \$3.50 to \$3.75 per net ton at oven. Wise County quotations are about the same, but New River producers are asking all the way from \$3.75 to \$4.25. Prompt shipment prices are governed largely by the ability of oven operators to get empty cars in which to load the coke. As far as can be ascertained no furnace coke contracts have been made in this territory in the past 10 days. Contract prices for furnace coke range from \$2.25 to \$2.60 for Connellsville grades, but for prompt shipment as high as \$3.75 at oven is asked.

Finished Material.—No new advances in warehouse prices have been made since last week's report, but it is reported that advances are scheduled to take effect before the end of the present week. We quote steel bars from stock at 3c. base; twisted steel bars, 3.15c.; plates, $\frac{1}{4}$ -in. and thicker, 3.50c.; rounds, 2-in. and over, 3.50c.; structural shapes, 3c.; No. 10 blue annealed sheets, 3.25c.; No. 28 galvanized sheets, 5c. The mill quotation on No. 28 galvanized sheets is 5.15c., Cincinnati, or Newport, Ky., and No. 28 black, 3.05c.

Old Material.—A small advance has been made on practically all kinds of scrap. Heavy melting steel scrap is in better demand, and outbound shipments are now showing considerable improvement. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern

Ohio, and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton
Bundled sheet scrap.....
Old iron rails.....
Relaying rails, 50-lb. and up.....
Rerolling steel rails.....
Heavy melting steel scrap.....
Steel rails for melting.....

Per Net Ton
No. 1 railroad wrought.....
Cast borings.....
Steel turnings.....
Railroad cast scrap.....
No. 1 machinery scrap.....
Burnt scrap.....
Iron axles.....
Locomotive tires (smooth inside).....
Pipes and flues.....
Malleable and steel scrap.....
Railroad tank and sheet scrap.....

St. Louis

ST. LOUIS, Mo., March 6, 1916.

Pig Iron.—Sales include one of 800 tons of malleable and a half dozen of 500 tons Southern foundry. Practically all sales reported have been for last half delivery. Inquiries still pending aggregate about 5000 tons in about equal proportions of Northern and Southern iron.

Coke.—Sales have been of small lots for immediate delivery and have commanded what amounts to premium prices. Melters are urging forward with all the influence at their command coke which has been contracted for and are fighting a hand-to-mouth situation as a result of the Connellsville car difficulties.

Finished Iron and Steel.—Coming fabricating work includes a large hotel and one large office building. Fabricators report from \$3,000,000 to \$5,000,000 of spring building in sight of various classes, and they are getting anxious for their contracted tonnage to come along. In steel rails, 600 tons of standard sections was sold and the 5000 tons inquiry previously reported has not been closed due to negotiations over deliveries. One inquiry for light rails is for 400 tons. We quote for stock out of warehouse as follows: Soft steel bars, 2.95c.; iron bars, 2.90c.; structural material, 2.95c.; tank plates, 3.20c.; No. 10 blue annealed sheets, 3.15c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.25c.

Old Material.—Dealers have begun to run to cover and as a consequence the prices are sharply higher. Buying now being done is almost entirely by the dealers themselves. Shipments north and east are reported in considerable volume. Lists out during the week include these: Wabash, 2500 tons; Mobile & Ohio, 1000 tons; Kansas City Southern, 200 tons; Southern Railway, 4500 tons; Chicago & Alton, 1000 tons. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton
Old iron rails.....
Old steel rails, rerolling.....
Old steel rails, less than 3 ft.....
Relaying rails, standard section, subject to inspection.....
Old carwheels.....
No. 1 railroad heavy melting steel scrap.....
Heavy shoveling steel.....
Frogs, switches and guards cut apart.....
Bundled sheet scrap.....

Per Net Ton
Iron angle bars.....
Steel angle bars.....
Iron car axles.....
Steel car axles.....
Wrought arch bars and transoms.....
No. 1 railroad wrought.....
No. 2 railroad wrought.....
Railroad springs.....
Steel couplers and knuckles.....
Locomotive tires, 42 in. and over, smooth inside.....
No. 1 dealers' forge.....
Mixed borings.....
No. 1 busheling.....
No. 1 boilers, cut to sheets and rings.....
No. 1 railroad cast scrap.....
Stove plate and light cast scrap.....
Railroad malleable.....
Agricultural malleable.....
Pipes and flues.....
Railroad sheet and tank scrap.....
Railroad grate bars.....
Machine shop turnings.....

Birmingham

BIRMINGHAM, ALA., March 6, 1916.

Pig Iron.—March "came in like a lion," tearing great holes in iron-making capacity. The Alabama Company, the middle of last week, retired from the market, both for high silicon Clifton and for regular foundry, after making bookings of 15,000 tons in two weeks. High silicon sold as high as \$18.50, a record price, while the regular foundry brought \$15 and \$15.50 for first and second halves. Belated consumers, who around the middle and latter part of February made firm offers of \$15 for last half iron to the extent of 10,000 tons, entered the market with an advance of 50c. per ton too late for booking, the company not caring to take any more for any delivery at this time. This condition justifies an increased interest in the company's tentative plans to resume at the two Gadsden stacks. The Republic Company made fair sales in February and very large ones in the first few days of March. The Woodward Company has booked an extremely large business, the heaviest in months, and is another maker apt to retire from the market for a period. The Sloss-Sheffield Company reports sales of "more than make." The Tennessee Company alone is not mentioning large sales, but this company, it must be remembered, no longer figures conspicuously in the foundry market on account of its own requirements of basic. The pivotal event is, of course, the announcement of the Woodward Company that its furnace just blown in will operate on basic from July 1 to January, and for a possibly indefinite period thereafter. With only 100,000 tons of free foundry iron on hand as compared with recent heavy sales and the prospect of additional changes from foundry to basic, the available supply of Alabama foundry iron after July 1 is not comforting to the consumer. Operators have been conservative as to price, the \$15 and \$15.50 minimums for first and second halves being as a rule the maximums also, although a considerable tonnage for second half at \$16 has also been done. The events of the first week in March are stiffening and indicate the likelihood of 50c. per ton advance. Early March sales have approximated 75,000 tons, with inquiries for over 100,000 tons in hand. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$15.50 to \$16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—The water and gas pipe market holds its own with persistent strength, which comes largely from municipal buying in the Middle and Far West. Production is increasing and prices are steady at the advance. The sanitary shops are not so busy. Jobbers laid in a large supply in the early winter anticipating the rise in the price of pig iron and have not yet disposed of stocks. Labor trouble at Anniston sanitary shops continues. The National Cast Iron Pipe Company will on April 4 consider an increase of its capital stock from \$200,000 to \$350,000. The company's operations have been singularly successful. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths. One maker quotes \$27 and \$24 respectively.

Coal and Coke.—The coal market has received such a stimulus recently as has not characterized it for months. The Alabama Coal Transportation Company, which has taken over the Warrior River transportation business of the Pratt Consolidated and other coal operators, is securing Mobile harbor frontage and preparing to move 5,000,000 tons per annum to gulf ports. The Louisville & Nashville Railroad has reduced the milling-in-transit rate on coal to coking plants from 50 and 60c. per ton for a 25-mile haul to 17½c., which will enable the assembling at coking plants of proper coals and lower the cost of manufacture. This will stimulate the Texas and Mexican trade and prove a handicap to Virginia and West Virginia competing coke. The Yolande Coke & Coal Company, the Sayre Mining &

Mfg. Company and other beehive coke makers are putting every available oven into operation. The Tennessee Company has beehive ovens at Bessemer that had been idle since 1912. We quote beehive foundry coke per net ton, f.o.b. oven, at \$3.75 for Brookwood and \$4 for Yolande 72-hr., with furnace coke at \$2.85 to \$3.05.

Old Material.—Dealers report better conditions and the market inclining to strength at the reduced quotations, with a fair chance for price recuperation. The volume of business in cast and steel scrap of all classes has increased. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	\$13.00 to \$13.50
Old steel axles	13.00 to 13.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.25
Tram carwheels	10.00 to 10.25
Stove plate	8.50 to 9.00

New York

NEW YORK, March 8, 1916.

Pig Iron.—The Eastern pig-iron market has been quieter in the past two weeks than those of the Central West or, in fact, in any other important consuming district. However, sellers have disposed of a considerable amount of iron each week and several contracts have been reported in the past few days. In one case a Rhode Island foundry bought 3500 tons of No. 2 X and No. 2 plain for second half delivery. A New Jersey foundry that was in the market for 1000 tons last week has closed at \$19.75 delivered for No. 2 X. Furnaces are offering somewhat more spot iron than usual in territory not embargoed and these transactions have not contributed to firmer prices. In Buffalo iron the range appears to be from \$18 to \$19 at furnace for No. 2 X, the lower price being made on syndicate iron and in one case by a furnace interest. Another seller is asking \$18.75 Buffalo for No. 2 X and a third has put its figure at \$19. Buffalo iron coming by rail into the Metropolitan district is moving more freely, but the New Haven Railroad will not unload lighters at its Harlem docks. Coke buying by foundries has been more active in the past week, some scores of buyers having closed for the second half and for longer periods. New England foundries got considerable coke in the recent open period, but the Pennsylvania Railroad has had an embargo to New Haven Railroad points since Feb. 28. Probably 20,000 tons of pig iron has been sold through local offices in the week, almost entirely foundry iron. We quote at tidewater as follows for early delivery: No. 1 foundry, \$20.25 to \$20.75; No. 2 X, \$19.75 to \$20.25; No. 2 plain, \$19.50 to \$10.75; Southern iron at tidewater, \$20 to \$20.50 for No. 1 and \$19.50 to \$20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British producers have advanced their quotation on ferromanganese \$25 per ton to \$175, seaboard, but most of them are out of the market temporarily and have nothing to sell for delivery in 1916. One firm here has been authorized to sell several thousand tons at the new quotation, but only for delivery in 1917. The allotment was quickly disposed of. Of spot material a small lot has sold at \$300 and it is stated, but not confirmed, that several carloads went at \$325 to \$350. The principal anxiety apparent has reference to urgent need of shipments on contract. The receipts from England are probably up to the recent average. The Lackawanna Steel Company's production of ferromanganese in one of the Colebrook furnaces at Lebanon, Pa., will begin when ore is received; it is expected that this will be soon. The fact that two domestic companies which had a considerable output in 1915 are not producing now is not encouraging as to nearby supplies. Spiegeleisen is in urgent demand and is not easy to get even on contract. Some that has averaged 25 to 30 per cent manganese has sold at \$4 per unit. Ferrosilicon, 50 per cent, is harder to obtain and it is not improbable that the basis of \$83 to \$85, Pittsburgh, at which some new contracts have been negotiated, may be advanced. The increased out-

put of the large Canadian producer, which this year will much exceed that of 9000 tons in 1915, as well as the amount available in April from the new Western producer announced in this issue of THE IRON AGE, will relieve the present scarcity and urgent demand.

Structural Material.—New structural projects comprise chiefly plant extensions, regarded as essential and not dependent on or influenced particularly by prices of building materials, and railroad bridge work on which prices are rarely a leading consideration. What other building work will go through will depend largely on the attitude of the purchaser regarding the tendency of prices. While further projects have been withdrawn, with the claim that lower prices will be obtainable later in the year, the steel trade feels that the general continued strength of finished steel as a whole will maintain the structural market. While admitting that generally speaking there is less business scheduled against the structural mills than for other forms of finished steel, there are great possibilities of a strong export demand for shapes. Fabricated prices, it is admitted, may be somewhat easier, but the competition in this respect has been pretty severe and the consensus of opinion is that with steel no lower than its present level, the cost of steel building work will not be reduced in 1916. Railroad work looms prominently in the week, but more buildings have been closed. Some of them under special request appear to be kept secret for the time being, so that all of the large jobs of recent settlement cannot be reported. The railroad work up includes some 6500 tons for the approaches to the Cincinnati bridge of the Chesapeake & Ohio; a round tonnage for the Baltimore & Ohio, 2500 tons for the Norfolk & Western at Norfolk, 200 tons for signal bridges for New York Central, and about 1200 tons, awarded to the American Bridge Company, for the Long Island Railroad for transfer bridges at Bay Ridge, Brooklyn. Building work under consideration and not heretofore reported embraces 5000 tons for the Manhattan Refrigerating Company, Marginal Row, New York; 1000 tons for column construction for a reinforced concrete structure for the Overland Automobile Company; 300 tons for a garage at Park Avenue and 106th Street; 600 tons for a residence for O. H. Kahn at Cold Spring Harbor, L. I.; 700 tons for a hotel for Vincent Astor, Forty-fifth Street near Eighth Avenue; and 700 tons reported for a Y. W. C. A. in Baltimore, and 900 tons, awarded to Lewis F. Shoemaker & Co., for four sub-stations for the Interborough Rapid Transit Company. Meanwhile the Brooklyn Edison Company has withdrawn from the market the inquiry for 500 tons for its office building on Pearl Street, Brooklyn. The Ingersoll-Rand Company is reported in the market for 400 tons for a building at Painted Post, N. Y., and a viaduct at Kearney, N. J., 600 tons, is up for figures. We quote mill shipments at 2.419c., New York, and buying out of store at 2.95c., New York.

Steel Plates.—The market is narrowing down both as regard time of delivery and the number of mills which will consider new business. One Pennsylvania mill is now asking 3.50c., Pittsburgh, on eight to ten weeks' delivery, while another remains at 3.25c., Pittsburgh, and has made that quotation on third quarter delivery, with a third nominally at 3c., Pittsburgh. Two lots of 500 tons were placed within about the week at 2.75c., Pittsburgh, and while records of actual transactions are not available at the moment, it would appear that an attractive offering to some of the Central West mills showing an interest in the Eastern market would be taken at 3c. For practically immediate shipments 4c. has been done on small lots of plates too wide to come from warehouses, which incidentally have now somewhat depleted stocks, and one special case of 5c., Pittsburgh, is noted. As averaging the case, we quote for prompt shipment 3.15c., Pittsburgh, or 3.319c., New York, and for plates out of store, 3.50c.

Iron and Steel Bars.—Bars for shell steel are still pressing the market and the present inquiries are for as much as the mill will consider. It becomes clearer that when mills accepted contracts some months ago, they figured on specifications at the rate of perhaps two-thirds of the contracted amounts, as usual, while the

actual result is that most if not all holders of contracts have specified for the full amounts each month. With the sold-up condition of the steel bar mills, the iron bar business continues active and strong. Steel bars are nominally 2.419c., New York, and higher prices are talked of, but where anything like early delivery is obtainable, 2.50c., Pittsburgh, has been obtained. Iron bars continue at 2.569c., New York, and the New York warehouse price of iron and steel bars is 2.95c.

Cast-Iron Pipe.—Atlantic City, N. J., opens bids on Thursday, March 9, for about 2500 tons of pipe for high-pressure service. On the same day New Brunswick, N. J., opens bids on about 240 tons of 6 to 12 in. Syracuse, N. Y., will let a contract March 13 on 470 tons of 6 to 12 in. Much attractive business is now being closed with private buyers. Although competition is keen on work of this character now coming up, prices generally show a disposition to advance, and a higher range appears to be imminent. For the present, car-load lots of 6-in., class B and heavier, are quoted at \$29.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Old Material.—The tone of the market is much better, although dealers and consumers continue to be hampered by railroad embargoes. In sympathy with the strength of Western markets steel scrap is slightly higher. As far as the Eastern situation is concerned, heavy buying of steel scrap would appear to be somewhat distant, as eastern Pennsylvania consumers are not only well supplied with stock in their yards but the nearby railroads are crowded with cars awaiting delivery. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap.....	\$14.50 to \$14.75
Rerolling rails	23.50
Rerolling rails	15.00 to 15.50
Iron car axles.....	25.00 to 25.50
Steel car axles.....	24.50 to 25.00
No. 1 railroad wrought.....	18.50 to 19.00
Wrought-iron track scrap	17.00 to 17.50
No. 1 yard wrought, long.....	15.50 to 16.00
No. 1 yard wrought, short.....	14.50 to 14.75
Light iron	7.00 to 7.50
Cast borings	8.50 to 8.75
Wrought turnings	7.50 to 7.75
Mixed borings and turnings	6.75 to 7.00
Wrought pipe	12.25 to 12.50
Old carwheels	13.50 to 14.00
Malleable cast (railroad)	12.50 to 13.00

Foundries in this vicinity are buying quite freely. Prices of cast scrap are firm. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	\$17.50 to \$18.00
No. 2 cast (heavy)	15.50 to 16.00
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

Buffalo

BUFFALO, N. Y., March 7, 1916.

Coke.—Contracts for foundry and other grades for the coming year are being placed by the foundries of the district at a rather rapid rate. Coking companies are willing to contract into the future, and most of the foundries have thought it advisable to cover their needs, even though in doing so they are anticipating by about three months the regular coke contracting period. Prices are averaging over \$1 per ton higher than the contract basis of last year. This increase is occasioned by the great shortage of labor in the coking fields, which is cutting down production materially and is a condition which will undoubtedly obtain during the year.

Pig Iron.—Sales by one interest since Feb. 1 aggregate 90,000 tons of all grades, the largest one being for 10,000 tons. The market is very strong and products are holding stiffly for \$19 at furnace for the standard silicon grades for delivery over the remainder of the year. Sales in the past week have been confined almost entirely to the one producer, whose quotations have been slightly under the prevailing schedule in the past few weeks and the tonnage booked, it is stated, reached a large total. One order covered de-

livery to July 1, 1917. This seller has now withdrawn from the low basis of prices recently quoted and is selling on a higher schedule. No. 2 X is now firmly established at from \$18.75 to \$19, at furnace, to July 1, all producers maintaining this range. Inquiry is livelier than for some time, indicating that buyers are more interested in covering for their future needs and it is likely this condition will become more prominent from week to week. We quote as follows, for delivery through first half and third quarter, f.o.b. furnace, Buffalo:

No. 1 foundry	\$19.00 to \$19.50
No. 2 X foundry	18.75 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.50
Gray forge	18.50
Malleable	19.00 to 19.50
Basic	19.00 to 20.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Very few new contracts are being placed owing to sold-up conditions. Some producers have orders on their books for full capacity of production to the end of the year, and such orders as have been taken recently are for ten months delivery. The proportion of unspecified tonnage on contracts in hand is smaller than ever before known. Structural material is seven to eight months behind in delivery with nothing now obtainable before the last quarter, and plates are still further behind. Somewhat higher prices are being quoted for fourth quarter contracts ranging from \$2 to \$5 per ton for bars, bands and hoops. Mills are trying to confine bars and bands to third quarter contracts, and if users wish to cover for longer periods they are obliged to pay higher prices. On shapes and plates mills and agencies are not contracting further ahead than second quarter for delivery at mill's convenience. The F. L. Hughes Company, Rochester, has a contract for the structural steel for Public School No. 37, that city, about 200 tons, and the Phoenix Iron Company, Phoenixville, Pa., for steel for large stable for Sibley, Lindsay & Curr Company, Rochester, about 300 tons.

Old Material.—The market is very strong, the demand for heavy melting steel being the best that has appeared since the first of the year and prices for this commodity have advanced during the past week 50c. per ton. Old carwheels, railroad malleable and cast scrap continue to be somewhat weak as compared with the rest of the list, but with the exception of these the demand for all other lines continues in very good volume. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$17.00 to \$17.50
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast, scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	15.25 to 15.75
Machine shop turnings	7.75 to 8.25
Heavy axle turnings	12.00 to 12.50
Clean cast borings	9.25 to 9.75
Old iron rails	17.50 to 18.00
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	12.00 to 12.50
No. 1 busheling scrap	14.50 to 15.00
No. 2 busheling scrap	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

The Burd High Compression Ring Company, Rockford, Ill., announces the opening of two additional sales offices. E. C. Fish was appointed manager of the new office at Rochester, N. Y., which is located at 558 Lyell Avenue, and the new office at Pittsburgh will be under the management of E. J. McClees, at 904 East End Trust Building. C. O. Schlagenhauff, formerly with the L. C. Smith Typewriter Company, will make his headquarters at the Detroit branch. L. G. Rasmussen, for a number of years with the Woods Vehicle Company, will be attached to the Chicago office.

The Somerville Iron Works, which have been conducted at Somerville, N. J., by B. Lissberger & Co., have been incorporated under the laws of New Jersey as the Somerville Iron Works.

Pittsburgh

PITTSBURGH, PA., March 7, 1916.

Advances in prices in the past week were not so numerous, but all indications favor a higher level on practically the whole iron and steel list. Basic iron is up 25c. to 50c. per ton; shafting, \$5; skelp, \$2 to \$3; most grades of scrap, 25c. to 50c., and spot coke about 25c. There is not the slightest abatement in the tremendous pressure on the mills for material, and in spite of the heaviest outputs ever recorded they seem to be getting further back in deliveries. Some consumers are still puzzled whether to take chances and place contracts at the present high prices or to hold off in the belief that possibly there may be a break in the market before they need the material. There is a feeling that prices have been put up too fast, and a few in the trade are looking for a break about July, but are unable to give any sound reasons why it should come. For months it has not been a question of price, but where to find a mill that can take the order and make the deliveries customers want. This condition is steadily getting more strongly entrenched, and an offer for 3c. for plates for last quarter shipment is said to have been refused by at least one mill. Practically nothing is doing in export business, the serious embargoes by the railroads being responsible. Where a mill wants to load an export shipment, it can only do so by having a specific boat waiting to receive it.

Pig Iron.—The week has been very active. The Standard Steel Works Company bought 15,000 to 20,000 tons of basic, nearly all from Valley furnaces, at about \$18 at furnace; Follansbee Bros. Company, 9000 tons of basic at \$18, Valley furnace; Westinghouse Air Brake Company, 15,000 to 20,000 tons of low silicon iron at about \$18, Valley furnace, part for delivery in second quarter, but most for last half; Standard Sanitary Mfg. Company, 12,000 to 15,000 tons of No. 2 foundry iron for last half at about \$18.50, Valley furnace; National Malleable Castings Company, 6000 tons of basic, deliveries 1000 tons a month for last six months of this year, prices to be those quoted from week to week in the Pittsburgh report in THE IRON AGE. The Pittsburgh Iron & Steel Foundries Company is inquiring for 10,000 tons or more of Bessemer iron for last half. We note a sale of 5000 tons of basic iron for last half at \$18.40, Valley furnace, and another of 3000 tons for earlier shipment at \$18.25, Valley furnace; also a sale of 6000 tons of Bessemer, made a week ago or more, for last half at \$20, Valley furnace, and another of 3000 tons for last half, at \$20.50, Valley furnace, also 500 tons of standard Bessemer iron for export shipment at \$21, Valley furnace. There is considerable inquiry for Bessemer and malleable Bessemer, reports being that a leading consumer is in the market for 80,000 to 90,000 tons of Bessemer, deliveries to start in third quarter, and extend over remainder of the year. Details of this proposed inquiry could not be obtained. Prices on all grades of pig iron are very firm, and we quote: Standard Bessemer iron, \$20.50 to \$21; basic iron, \$18.25 to \$18.50; malleable Bessemer, \$18.75 to \$19; gray forge, \$17.50 to \$17.75, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight being 95c. per ton for delivery in the Pittsburgh and Cleveland districts.

Ferroalloys.—English makers have again advanced prices \$25 per ton on 80 per cent ferromanganese and now quote \$175, seaboard, with no guarantee as to deliveries, and with the same restrictions that have hung over foreign ferromanganese for some months. For shipment from stock, 80 per cent foreign or domestic ferromanganese is quoted at \$250 to \$300 per ton. Nominal prices on 50 per cent ferrosilicon in lots up to 100 tons are \$85; over 100 tons, and up to 600 tons, \$84; over 600 tons, \$83, all per gross ton, delivered in the Pittsburgh district. Prices as high as \$110 per ton are quoted on 35 per cent spiegeleisen, and \$50 is quoted for 18 to 22 per cent. Prices of Bessemer ferrosilicon for delivery over the remainder of the year are now as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$41. Seven per cent silvery for the same delivery is \$26.50; 8 per cent, \$27;

9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—Reports are that a sale of 4000 tons of basic open-hearth billets was made recently by a Cleveland interest at \$42 per ton at mill, to a Pittsburgh consumer, the billet costing the buyer about \$43.50 delivered. It is said that the same mill is now quoting \$45 to \$46 at mill for open-hearth billets. It would be impossible to buy either Bessemer or open-hearth billets for reasonably prompt shipment at less than \$40, maker's mill, and for spot delivery as high as \$45 might have to be paid. We have advanced prices and now quote: Bessemer billets, \$40; open-hearth billets, \$40; Bessemer sheet bars, \$40 to \$41, and open-hearth sheet bars, \$40 to \$41, maker's mill, Pittsburgh or Youngstown districts. We quote forging billets at \$60 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 per ton extra.

Plates.—The Bessemer & Lake Erie Railroad has placed 2500 steel hoppers and gondola cars, 750 each, with the Pressed Steel Car Company and the Standard Steel Car Company, 500 with the Ralston Steel Car Company and 500 with the American Car & Foundry Company. The Standard Steel Car Company has taken 500 automobile cars for the New York, New Haven & Hartford, and the Pittsburgh Plate Glass Company has placed twelve hoppers with the Pressed Steel Car Company. Inquiries are reported in the market for 2500 to 3000 cars, but it is said the very high prices being quoted by the steel car makers are holding back orders to a great extent. Deliveries on plates are harder to get than on any other finished material, all the plate mills being badly oversold. The two leading local makers have sold their output for the remainder of this year. We quote $\frac{1}{4}$ -in. and heavier plates at 2.35c. at mill for such deliveries as the mill could make, which would be last quarter or first quarter of next year, 2.75c. to 3c. for delivery in second and third quarters, while it is said that up to 3.50c. has been paid at mill for delivery in six to eight weeks.

Structural Material.—New inquiry is very active. The McClintic-Marshall Company has taken 600 tons for steel buildings for the Standard Seamless Tube Company, Economy, Pa.; American Bridge Company, 1500 tons for new steel buildings for the Firestone Tire & Rubber Company, Akron, Ohio; Jones & Laughlin Steel Company, 600 tons for the Goodyear Rubber Company, Akron, Ohio; Riter-Conley Mfg. Company, about 2000 tons for steel buildings for the new Baltimore Sheet & Tin Plate Company, Baltimore, Md.; Fort Pitt Bridge Works, about 1200 tons of bridge work for the Baltimore & Ohio Railroad; Massillon Bridge & Construction Company, 1025 tons for the German-American Cement Company, La Salle, Ill. The American Bridge Company is furnishing about 3000 tons for additions to the Lorain plant of the National Tube Company and the Chesapeake & Ohio Railroad is in the market for about 3000 tons of bridge work. We quote beams and channels up to 15 in. at 2.25c. at mill for extended delivery, and 2.50c. to 2.75c. for delivery in two to three months from date of contract.

Steel Rails.—The Carnegie Steel Company has taken an order for 500 tons of 80-lb. rails for the Cleveland Railways Company and 20,000 steel ties for the same road, and 1000 tons of standard sections for a traction company. The new demand for light rails is very active, running 5000 to 6000 tons per week. We quote light rails as follows: 25 to 45-lb. sections, 1.85c.; 16 and 20-lb., 1.90c.; 12 and 14-lb., 1.95c., and 8 and 10-lb., 2c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Sheets.—Prices on all grades of sheets are steadily hardening, and nearly all mills are now quoting 2.75c.

for Nos. 9 and 10 blue annealed and the same price for 28 gage box annealed. While 4.75c. is still named by some mills for galvanized sheets, others are quoting 5c. flat, and state they have made sales at that price. The demand for sheets is heavy, and mills are sold up for two or three months, and are very much behind on deliveries. For delivery in second quarter we quote: Nos. 9 and 10 blue annealed sheets, 2.75c. to 2.85c.; No. 28 Bessemer black, 2.75c. to 2.85c.; open-hearth, 2.85c. to 2.95c.; No. 28 galvanized sheets from Bessemer stock, 4.75c. to 4.85c.; and from open-hearth, 4.85c. to 5c., at maker's mill. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.60c.; Nos. 25, 26 and 27, 2.65c.; No. 28, 2.75c.; No. 29, 2.85c., and No. 30, 2.90c. These prices are for carloads and larger lots, f.o.b. maker's mill.

Tin Plate.—The order for 360,000 boxes of tin plate for Asia, noted in this report several times, has gone to English mills, as American mills could not make the deliveries wanted. Specifications against contracts for tin plate are very heavy, and none of the local mills has any tin plate to sell for delivery before August or September. Prices are very strong at \$4 per base box, and sales from stock have been made at \$4.25 and in a few cases at \$4.50. It is said some consumers who have not covered their entire needs of tin plate for last half of the year are balking strongly at the \$4 price, but with present conditions in the tin-plate trade they will likely have to pay it or perhaps a higher figure if they hold off buying too long. We quote 14 x 20 coke plates at \$4 per base box for extended delivery, and \$4.25 from stock. We quote 200 lb. base, common ternes, 8-lb. coating, at \$6.90 to \$7 per base box.

Cold-Rolled Strip Steel.—The new demand is very active, prices are strong and likely to be higher. We note a sale of 100 tons and another of 125 tons at \$5.25 base, deliveries at convenience of the mill. Prices quoted by the makers range from \$5 minimum up to \$6 base, for delivery at convenience of the mill, extras standard with all the makers being in part as follows:

Base price for 1 $\frac{1}{2}$ -in. and wider, hard, in coils, 0.10 to 0.19 carbon. Extras for size, annealing, cutting, etc., as follows:

Thickness	0.100-in. and thicker	0.050-in. to 0.079-in.	0.036-in. to 0.049-in.	0.025-in. to 0.044-in.
Extra for thickness...	.05	.20	.20	.45
Extra for annealing...	.25	.25	.40	.40
Width Extras				
Under 1 $\frac{1}{2}$ to 1-in. inc.	.15	.15	.15	.15
Under 1 to $\frac{3}{4}$ -in. inc.	.30	.30	.30	.30
Wider than $\frac{3}{4}$, not over 9-in.	...	...	...	.25
Wider than 9, not over 12-in.	...	...	.25	.25
Wider than 12, not over 15-in.	...	...	.50	.50
Cut Lengths Extra				
1-in. and wider...	.10	.15	.15	.40
Under 1-in. to our limits	.25	.50	.50	.75

Reductions for carload lots of a size. For orders 18 tons or over, one width and gage, shipment at one time, there is a regular reduction from the net price of 15c. per cwt.

For all tempers other than full hard for flat work add annealing extra.

Skelp.—There is a scarcity in the supply mills being sold up for three or four months, and prices are higher. We now quote grooved steel kelp at 2.25c. to 2.30c.; sheared steel skelp, 2.35c. to 2.40c.; grooved iron skelp, 2.60c. to 2.70c., and sheared iron skelp, 2.90c. to 3c., all delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—Specifications from the railroads are only fairly active. The Pittsburgh & Lake Erie Railroad lately placed 3000 kegs of spikes and other roads fair sized lots. Prices are strong as follows:

Standard railroad spikes, 4 $\frac{1}{2}$ x 9/16 in. and larger, \$2.50; railroad spikes, $\frac{1}{2}$ and 7/16 in., \$2.60 base; railroad spikes, $\frac{3}{8}$ in. and 5/16 in., \$2.90 base; boat spikes, \$2.65 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Rods.—New demand is very heavy and local mills have no rods to spare. An inquiry is in the market for 10,000 tons of No. 5 rods for shipment to Canada, but none of this business is likely to come here. Mills delivering rods in Canada have to declare their market value, and this has lately been \$50, but it is probable it will be raised soon to \$55. We quote Besse-

mer, open-hearth and chain rods at \$50 to regular customers for such deliveries as the mills can make, which would likely be in second half. For prompt delivery rods would readily bring \$55 and perhaps \$60, sales having been made at \$55 at mill.

Wire Products.—Mills report new inquiry active and specifications very heavy. On the regular sizes of wire nails, the shortage in supply is acute. The mills are shipping their product as fast as made, but it is estimated that consumers are not getting more than half the wire nails and wire called for in their contracts. Local makers are not quoting freely on new inquiries, being sold up to July and August or later. Prices quoted by the mills to the large trade only, on which shipments would not be promised inside of three or four months, are as follows: Wire nails, \$2.40; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed wire, \$2.25; galvanized barb wire and fence staples, \$3.25; painted barb wire, \$2.55; polished fence staples, \$2.55; cement coated nails, \$2.40 base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots; 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Rivets.—Deliveries of steel by the mills to the rivet makers are very slow, and this is cutting down output very much. The new demand is heavy, and makers are sold up for three or four months. Prices are very strong, and are practically certain to be higher. We quote buttonhead structural rivets, ½ in. and larger, at \$3 and cone-head boiler rivets at \$3.10 per 100 lb. in carload lots, f.o.b. Pittsburgh. Smaller lots bring about 10c. advance. Discount on small rivets is now 60, 10 and 10.

Shafting.—Prices have again been advanced \$5 per ton, the minimum discount of all the makers on car-loads now being 30 per cent off, and on less than car-loads 25 per cent off. The new demand is heavy and none of the makers has any to sell for delivery inside of six to eight months. For fairly prompt shipment, consumers are offering \$5 to \$10 per ton advance, but often do not get the material.

Iron and Steel Bars.—The nominal price of steel bars for mill shipment is 2.25c., but this would mean delivery in last quarter, and possibly not before first quarter of 1917. Large orders of steel rounds are still being offered to local makers which they cannot accept, as they have their entire output sold for months ahead. Prices on refined iron bars are very strong, and the mills are well sold up for several months. It is said that none of the large consumers, notably the implement makers, has been able to cover for delivery beyond last half of this year. We quote steel bars at 2.25c. for delivery in third and fourth quarters, and 2.50c. to 2.75c. for delivery in four to five weeks. Prices from warehouse range from 2.75c. up, depending on quantity. We quote refined iron bars at 2.25c. to 2.30c. and railroad test bars at 2.30c. to 2.40c., f.o.b. mill, Pittsburgh.

Hoops and Bands.—The nominal price of bands remains at 2.25c. and hoops 2.50c. at mill for extended deliveries, but for shipment within two or three months premiums of \$5 per ton or more are offered. We quote steel hoops at 2.50c. and steel bands at 2.25c., with extras on the latter as per the steel bar card. These are mill prices only for greatly deferred deliveries, but, for shipment in six to eight weeks or longer, steel hoops would probably bring 2.75c. and bands 2.50c. at mill.

Merchant Steel.—Mills are filled up for three or four months on all the material they can possibly turn out, and any prices quoted are purely nominal. Specifications are very heavy and prices seem certain to be higher. On small lots for delivery at convenience of the mill, which would be in third or fourth quarter, we quote: Iron finished tire, ½ x 1½ in. and larger, 2.20c., base; under ½ x 1½ in., 2.35c.; planished tire, 2.40c.; channel tire, ¾ to 7/8 and 1 in., 2.70c. to 2.80c.; 1 x 1/8 in. and larger, 3.10c.; toe calk, 2.80c. to 2.90c., base; flat sleigh shoe, 2.55c.; concave and convex, 2.60c.; cutter shoe, tapered or bent, 3.10c. to 3.20c.; spring

steel, 2.80c. to 2.90c.; machinery steel smooth finish, 2.60c.

Carwheels.—The two local makers of steel carwheels have their output sold up for practically all of this year and are very much back in shipments to the steel car plants. It is said several orders have been entered for steel forged wheels for delivery in the first quarter of 1917. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$21; 36-in. passenger or tender wheels, \$25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Nuts and Bolts.—The new demand is still abnormally heavy, all the makers of nuts and bolts being filled up for some months ahead and are much behind in deliveries. There is a good deal of complaint that the steel mills are falling down badly in deliveries of steel, and this is restricting output of nuts and bolts very materially. Discounts in effect at this writing, which are said to be for prompt acceptance only, are as follows:

Machine bolts, h. p. nuts, ¾ x 4 in., smaller and shorter, rolled, 65 and 10 per cent; smaller and shorter, cut, 65 and 5 per cent; larger or longer, 50 and 20 per cent.

Machine bolts, c. p. c. and t. nuts, ¾ x 4 in., smaller and shorter, 60 and 10 per cent; larger or longer, 50 and 10 per cent.

Common carriage bolts, ¾ x 6 in., smaller and shorter, rolled, 65 and 5 per cent; smaller and shorter, cut, 65 per cent; larger or longer, 50 and 15 per cent.

Blank bolts, 50 and 20 per cent. Tap bolts, 30 per cent. Bolt ends, with h. p. nuts, 50 and 20 per cent; c. p. c. and t. nuts, 50 and 10 per cent. Stud bolts, rough, 45 per cent; lag screws, cone or gimlet point, 65, 10 and 5 per cent.

Nuts, blank or tapped, h. p. square, 3.70c. lb. off; h. p. hexagon, 3.80c. lb. off; c. p. c. and t. square, 3.50c. lb. off; hexagon, 4.25c. lb. off; c. p. semi-finished, hexagon, 75 and 10 per cent. Finished case hardened nuts, 75 per cent.

Wrought Pipe.—The demand for both iron and steel pipe is very heavy and mills are sold up for two or three months. Several fairly large orders for line pipe, embracing about 150 miles, are being figured on and are likely to be placed shortly. The advances in black and galvanized iron and steel pipe, effective from Feb. 29, are being firmly held. Discounts on iron and steel pipe are given on another page.

Boiler Tubes.—Mills report the demand for locomotive and merchant tubes very heavy. It is said several large contracts for boiler tubes for delivery in last half of this year have lately been placed. Two local makers of seamless steel tubing say they have their output sold up for the remainder of this year. Discounts on tubes are printed on another page.

Coke.—The car situation is still bad, and the labor supply in the coke regions is getting worse, coke makers being unable at many plants to get out their whole product. There is a fairly heavy demand for blast-furnace coke for spot shipment, and in the past four or five days sales of 65 to 75 cars have been made of standard grade coke at \$3.75 per net ton at oven. All shippers are back in contracts, but they claim this is largely because the railroads are short of cars and motive power. A local interest has just closed a contract with an Eastern blast furnace for 7500 to 8000 tons per month, deliveries running March to December this year, at \$3 per net ton at oven. Firm offers of \$2.75 for blast furnace coke for last half have been turned down. A number of by-product coke plants now being built, that were expected to be making coke about July, will not be completed before probably October, and this has had the effect of making prices on coke for second half delivery considerably firmer. We quote best grades of blast-furnace coke for spot delivery at \$3.75, and on contracts, \$2.75 to \$3 per net ton at oven, some of the larger makers holding firm for the higher price. We quote best grades of 72-hr. foundry coke for prompt shipment at \$3.75 to \$4, and on contracts for second half of the year \$3.50 to \$3.75 per net ton at oven. The Connellsburg *Courier* gives the output of coke for the week ended Feb. 26 as 445,260 net tons, an increase over the previous week of 26,973 tons.

Old Material.—The local market as regards sales is quiet, but prices are very strong and likely to be higher. It is said the Carnegie Steel Company stands

ready to buy 50,000 tons or more of heavy steel scrap at a price, but dealers are not inclined to sell, asking higher figures. Heavy steel scrap was sold last week at \$18.50 per net ton, and this price would be paid by one or two large consumers, but dealers are asking \$19, as they are afraid to sell short, being confident the market will be higher. There is an active demand for machine shop turnings for blast furnace use, and sales of 20,000 tons or more for this purpose are reported at \$10 or better, delivered. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivered	\$18.00 to \$18.25
Hydraulic compressed bundled sheet scrap	16.00 to 16.25
No. 1 foundry cast	16.00 to 16.25
Bundled sheet scrap, side and ends, f.o.b. consumers' mills, Pittsburgh district	14.00 to 14.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.50
No. 1 railroad malleable stock	15.50 to 15.75
Railroad grate bars	10.50 to 10.75
Low phosphorus melting stock	20.00 to 20.50
Iron car axles	24.50 to 25.00
Street car axles	22.50 to 23.00
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.25 to 15.50
Machine-shop turnings	10.00 to 10.25
Cast-iron borings	11.00 to 11.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.50 to 18.75
Heavy steel axle turnings	12.75 to 13.00
Heavy breakable cast scrap	14.25 to 14.50

*Shipping point.

The Pittsburgh offices of Walter-Wallingford & Co., Cincinnati, Ohio, dealers in pig iron, steel and coke, have been removed from the Farmers Bank Building to room 634, Oliver Building, Pittsburgh, with George A. Wilson in charge.

British Market Still Chaotic

Negotiations Pending to Divert Scandinavian Iron Ore to Great Britain

(By Cable)

LONDON, ENGLAND, March 8, 1916.

The pig-iron market is still unsettled. Owing to the fixing of a maximum price and the prohibition of speculative dealings, home demand is temporarily checked, but there is good inquiry from abroad. A pending embargo on exports is being considered. Hematite pig iron is unchanged at 140s. Negotiations are proceeding for fixing Rubio ore at 34s. on ship, Tees, also for diverting to Great Britain all Scandinavian iron ore. Tin plates are strong at 28s. to 28s. 6d. and Russia is inquiring for a good quantity. There is a steady demand for ferromanganese and £35 has been paid for America. Quotations on some products are:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 28s. to 28s. 6d., against 27s. to 27s. 6d., last week.

Cleveland pig-iron warrants, 85s. 4½d., compared with 83s. 3½d., last week.

Steel black Sheets, No. 28, export, f.o.b. Liverpool, £20, nominal, against £19 10s., last week.

Steel ship plates, Scotch, delivered local yards, £13 5s.

Steel rails, export, f.o.b. works, port, £11.

Hematite pig iron, f.o.b. Tees, about 135s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £13 10s., against £12 5s., a week ago.

Steel bars, export, f.o.b. Clyde, £17 5s.

Ferromanganese, f.o.b., \$150.

Ferrosilicon, 50 per cent, c.i.f., £27.

Supplies of Sulphuric Acid Low, with Maximum Prices Fixed—The General Market Uncertain

(By Mail)

LONDON, ENGLAND, Feb. 22, 1916.—We are still painfully groping through the maze, but are so far without the clue, and business is at sixes and sevens. There has been a fair amount of speculation in Cleve-

land iron, which is mainly responsible for the rushing up of prices. Home consumers are keeping out of the market as long as they can, but those who have to cover their immediate needs do so at extreme prices. There is a good inquiry for iron for shipment, but permits are issued on a niggardly scale and where hematite is concerned it is almost impossible to obtain the necessary documents. Japan is wanting iron very badly, but there is not much inclination to let go supplies, though some is allowed to dribble out to European allies. The hematite market is very strong and for second half 140s is the general quotation with makers quite independent about doing business.

The fact that the market price of Cleveland pig iron has outstripped the Government maximum by many shillings a ton is causing a good deal of comment, which it is very difficult to understand. There is plenty of business, but the trade is being increasingly harassed by local difficulties, such as the rapid exhaustion of labor, the desperate railroad congestion, and the lighting restrictions, causing a reduction of output in the iron-making districts owing to the stoppage of furnaces involved. The lighting restrictions will probably be still further intensified.

In semi-finished steel there is no change. The tone is irregular and all sorts of prices are being paid, one consumer stating that he has bought moderately at about £12 from one source and bid £13 without success. Some American material is offering at about \$50 c.i.f. for 4 and 6-in. blooms for summer shipment. The finished steel trade has almost ceased, works being engaged upon Government contracts to the practical exclusion of everything else.

SULPHURIC ACID POSITION

Tin-plate prices continue to move up owing to the strength of tin and sheet bars, and works are much hampered by the acid position. Efforts are being made to utilize nitre cake and the experiments are being watched with the closest interest. There will be objections raised by the men, as there always is to any industrial development calculated to assist output, but the substitute will receive a fair trial, and it is hoped this may assist in rendering matters easier for the tin-plate manufacturers generally. The Ministry of Munitions has issued a notice to all sulphuric acid makers and dealers fixing maximum prices for the sale of the acid. The prices per ton for acid in railroad cars, carts or barges, at makers' works, are as follows:

	Degrees Twaddell	f	s.	d.
Class A— Arsenical acid, . . .	140	3	0	0
Class B— Dearsenical acid, . . .	144	3	15	0
Class C— Dearsenical acid, . . . 168 (93% H ₂ SO ₄)	6	0	0	0
Arsenical acid, . . . 168 (93% H ₂ SO ₄)	5	15	0	0

Extras include not more than 5s. per ton for filling and hire of tank trucks, not more than 10s. per ton for filling and hire of drums, and £1 per ton for filling and hire of carboys, or 10s. per ton for filling carboys only.

Provisional arrangements are understood to have been completed by which Pease & Partners, Ltd., of Darlington, will acquire the business of the Teesbridge Iron Company of Stockton-on-Tees. The capital of the first named concern amounts to £1,300,000 with £525,000 of debentures, while the Teesbridge capital is £44,175, with mortgages and charges amounting to £15,000.

New Owners of Robert Wetherell & Co.

The large plant of Robert Wetherell & Co., Chester, Pa., iron founders and manufacturers of Corliss engines, has changed hands, having been bought by State Senator William C. Sproul and associates of Chester. New directors of the company are W. C. Sproul, who is now president; S. Everett Sproul, vice-president, and Henry J. Klaer, secretary-treasurer. James H. Garthwaite, for many years superintendent, becomes general manager. The organization of offices and shops remains the same. It is stated that no contracts for war munitions have been taken, but that the business will be conducted along the same lines as before.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.; New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 2.25c. to 2.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	.155
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, $6\frac{1}{4}$ in. up to 100 in. wide, 2.35c. to 2.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent. $\frac{1}{4}$ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered $\frac{1}{4}$ -in. plates. Plates over 72 in. wide must be ordered $\frac{1}{4}$ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under $\frac{1}{4}$ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8.	.15
Gages under No. 8 to and including No. 9.	.25
Gages under No. 9 to and including No. 10.	.30
Gages under No. 10 to and including No. 12.	.40
Sketches (including straight taper plates), 3 ft. and over.	.10
Complete circles, 3 ft. in diameter and over.	.20
Boiler and flange steel.	.10
"A. B. M. A." and ordinary firebox steel.	.20
Still bottom steel.	.30
Marine steel.	.40
Locomotive firebox steel.	.50
Widths over 100 in. up to 110 in., inclusive.	.05
Widths over 110 in. up to 115 in., inclusive.	.10
Widths over 115 in. up to 120 in., inclusive.	.15
Widths over 120 in. up to 125 in., inclusive.	.25
Widths over 125 in. up to 130 in., inclusive.	.50
Widths over 130 in.	.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.	.155
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods.—Bessemer, open-hearth and chain rods, \$55, nominally.

Wire Products.—Prices to jobbers, effective Feb. 29: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.25; galvanized, \$2.95. Galvanized barb wire and staples, \$3.25; painted, \$2.55. Wire nails, \$2.40. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 61 1/2 per cent off list for carloads, 60 1/2 off for 1000-rod lots, 59 1/2 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.						
Nos. 0 to 9	10	11	12 & 12 1/2	13	14	15 16
Annealed	\$2.30	\$2.35	\$2.40	\$2.45	\$2.60	\$2.70
Galvanized	3.20	3.25	3.30	3.35	3.40	3.55

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Feb. 29, 1916, on black and galvanized steel and iron pipe, all full weight:

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ ...	.67	40 $\frac{1}{2}$	$\frac{1}{8}$ and $\frac{1}{4}$ ...	.56	.29	$\frac{1}{8}$ ...	.57	.30
$\frac{1}{2}$ ...	.71	53 $\frac{1}{2}$	$\frac{1}{2}$ ...	.61	.40	$\frac{1}{2}$ ...	.64	.45
$\frac{3}{4}$ to 3 ...	.74	57 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$ ...	.63	.44	2 ...	.63	.44

Lap Weld		
$\frac{1}{2}$ to 6 ...	.71	54 $\frac{1}{2}$
$\frac{1}{2}$ to 12 ...	.73	56 $\frac{1}{2}$
13 and 14 ...	.69	51 $\frac{1}{2}$
15 ...	.56	..

Reamed and Drifted		
1 to 3, butt ...	.72	55 $\frac{1}{2}$
2, lap ...	.69	52 $\frac{1}{2}$
2 $\frac{1}{2}$ to 6, lap ...	.71	54 $\frac{1}{2}$

Butt Weld, extra strong, plain ends		
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ ...	.63	45 $\frac{1}{2}$
$\frac{1}{2}$ ...	.68	54 $\frac{1}{2}$
$\frac{3}{4}$ to 1 $\frac{1}{2}$ ...	.72	58 $\frac{1}{2}$
2 to 3 ...	.73	59 $\frac{1}{2}$

Lap Weld, extra strong, plain ends		
$\frac{1}{2}$ ...	.69	53 $\frac{1}{2}$
$\frac{1}{2}$ to 4 ...	.71	55 $\frac{1}{2}$
$\frac{1}{2}$ to 6 ...	.70	54 $\frac{1}{2}$
7 to 8 ...	.65	47 $\frac{1}{2}$
9 to 12 ...	.60	42 $\frac{1}{2}$

Butt Weld, double extra strong, plain ends		
$\frac{1}{2}$ ...	.59	45 $\frac{1}{2}$
$\frac{3}{4}$ to 1 $\frac{1}{2}$ ...	.62	48 $\frac{1}{2}$
2 to 2 $\frac{1}{2}$ ...	.64	50 $\frac{1}{2}$

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8 ...		.270 to .280
Nos. 9 to 10 ...		.275 to .285
Nos. 11 and 12 ...		.280 to .290
Nos. 13 and 14 ...		.285 to .295
Nos. 15 and 16 ...		.295 to .305

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 17 to 21 ...		.255 to .265
Nos. 22 and 24 ...		.260 to .270
Nos. 25 and 26 ...		.265 to .275
No. 27 ...		.270 to .280
No. 28 ...		.275 to .285
No. 29 ...		.280 to .290
No. 30 ...		.290 to .310

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11 ...		.375 to 4.00
No. 12 ...		.385 to 4.10
Nos. 13 and 14 ...		.385 to 4.10
Nos. 15 and 16 ...		.395 to 4.20
Nos. 17 to 21 ...		.410 to 4.35
Nos. 22 and 24 ...		.430 to 4.55
Nos. 25 and 26 ...		.445 to 4.70
No. 27 ...		.460 to 4.85
No. 28 ...		.475 to 5.00
No. 29 ...		.490 to 5.15

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, from Feb. 29, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 $\frac{1}{2}$ in.	.42	1 $\frac{1}{2}$ in.	.37 to .38
1 $\frac{1}{4}$ and 2 in.	.54	1 $\frac{1}{4}$ and 2 in.	.41 to .42
2 $\frac{1}{4}$ in.	.51	2 $\frac{1}{4}$ in.	.38 to .39
2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ in.	.57	2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ in.	.45 to .46
3 and 3 $\frac{1}{4}$ in.	.62	3 and 3 $\frac{1}{4}$ in.	.49 to .50
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	.63	3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	.51 to .52
5 and 6 in.	.56	5 and 6 in.	.45 to .46
7 to 13 in.	.53		

Locomotive and steamship special charcoal grades bring higher prices.

1 $\frac{1}{4}$ in. over 18 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

	Cents Per Pound for Early Delivery	Lead						Spelter
		Copper, New York	Tin, Electrolytic	New York	New York	St. Louis	New York	
Mar. 1.	27.25	27.00	47.50	6.40	6.40	21.00	20.75	
1.	27.25	26.87 1/2	46.50	6.52 1/2	6.52 1/2	20.75	20.50	
2.	27.25	26.75	47.00	6.57 1/2	6.57 1/2	20.25	20.00	
3.	27.25	26.62 1/2	47.50	6.57 1/2	6.57 1/2	20.00	19.75	
4.	27.00	26.50	49.00	6.57 1/2	6.57 1/2	20.00	19.75	
5.	27.00	26.50	49.00	6.70	6.70	19.25	19.00	

NEW YORK, March 8, 1916.

Copper is dull and lower. Tin is higher but tightly held and quiet. Lead is erratic, independents continuing to sell at higher prices than those quoted by the principal producer. Spelter is dull and has declined sharply. Antimony is quiet but quotations are unchanged.

New York

Copper.—The market has been very dull and prices are considerably lower. Consumers were so little interested that a diligent effort to incite bids, made late last week, was unsuccessful, and conditions since that time have not changed except perhaps to become easier. A feature of great interest was an order by the British Government on March 1, prohibiting dealing in future deliveries of metals. The move was designed to eliminate speculation in the metals needed for war munitions, and had the effect of closing the London Metal Exchange for four days. No prices were received by cable for March 1 to 4, inclusive. On the latter date the Ministry of Munitions yielded to the importunities of the British sellers and gave permission for the resumption of trading on the exchange under certain new regulations which are believed to involve a maximum price, but whose terms have not yet been made known here. The London quotations were resumed on Monday. Despite the efforts of the government, electrolytic in London continues to be quoted at £136. The British situation has had some effect on the American market, but not a great deal, and the trade is of the opinion that Great Britain will have to pay for copper the prices which war conditions impose. A more direct influence on the market has been the railroad freight embargoes. Many New England mills are hungry for the metal, and deliveries everywhere are being made in an irregular manner. One comparatively small mill which needed copper had 16 carloads placed suddenly on its siding with notification that unless the cars were unloaded in 48 hr. demurrage would be charged. Meanwhile the ground was covered with about a foot of snow. Prompt electrolytic was quoted yesterday at 26.50c. and this price could probably have been shaded. Lake is entirely nominal at 27c. The exports this month, including yesterday, total 4115 tons.

Tin.—In the latter part of last week the market was extremely dull, although on Friday about 200 tons changed hands. Some consumers will take anything that is offered, but while there is a fair quantity here it is being held to apply against old contracts. The British Government is stricter than ever in the matter of licenses to ship from either London or the Straits Settlement and brokers are fearful lest they are caught short. Small sales have been made on some days at wide ranges, as for instance on March 2, which was a dull day, small lots of spot sold at 46c., also at 47c. A few lots of spot have been sold this week at 49c. Up to yesterday only 145 tons had arrived this month, but there was afloat 6558 tons.

Lead.—The situation is most unusual and puzzling. There is a heavy demand from both domestic and foreign sources, and consumers appear willing to pay almost any price that is asked. Independents have been getting premiums of 15 points or more over the quotation of the leading producer. Last Friday the leading interest advanced its quotation from 6.30c. to 6.40c., New York, or \$2 per ton, which was a cause of surprise as a larger advance was expected. Yesterday it ad-

vanced its quotation \$4 per ton or to 6.60c., New York, but independents were quoting far over this figure. In fact, late last week they were getting 6.75c., New York. New York and St. Louis are on a parity when all prices are considered. The leading interest is not selling freely, but at the quotation mentioned is doing out to its customers the quantities it believes they require. The crux of the situation, from all indications, is that early shipment lead is scarce. In fact, there are but few sellers among the independents and these are caring only for their regular customers. There is a growing belief that when the independents are completely filled up, and the leading interest has acquired all of the ore and raw materials it needs, it will advance its prices sharply and be in possession of the field. The London quotations are firm. The quotations given in the table at the head of this report represent the averages of the prices quoted by the American Smelting & Refining Company and outside sellers. The exports of the month, including those of yesterday, total 701 tons.

Spelter.—For several days the market has been dull and prices have declined, until prompt spelter was quoted yesterday at 19.25c., New York, and 19c., St. Louis. The London quotation for spot dropped £8 yesterday, it is believed as a result of the new regulations. Yesterday spelter was not easy to sell, and the only explanation was the difficulty in making shipments to New England points. The exports this month, including yesterday, total 177 tons.

Antimony.—The market is quiet but firm and quotations are unchanged at 44c. to 45c., duty paid.

Aluminum.—The market holds firm at 61c. to 64c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Old Metals.—The market is quiet. Dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 26.00
Copper, heavy and wire	24.00 to 25.00
Copper, light and bottoms	20.00 to 21.00
Brass, heavy	15.00 to 15.50
Brass, light	12.50 to 13.00
Heavy machine composition	18.00 to 19.00
No. 1 yellow rod brass turnings	16.00 to 16.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	5.75
Lead, tea	5.25
Zinc	14.00 to 15.00

St. Louis

MARCH 6.—Prices are well held at these quotations: Lead, 6.90c.; spelter, 22c.; tin, 51c.; Lake copper, 29.50c.; electrolytic copper, 29.25c.; Asiatic antimony, 49.50c. In the Joplin ore market there has been increased buying, with higher prices. Zinc blende sold at a top basis price of \$115 per ton, ranging down to \$95 on second grades, with premium ores as high as \$121 on settlement; calamine, \$75 to \$85; lead ore, \$89. The average price of ores for the week's production of the district was: Zinc blende, \$102; calamine, \$82; lead, \$87. Buying prices of miscellaneous scrap metals are quoted as follows: Light brass, 10.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 19c.; zinc, 12c.; lead, 5.50c.; tea lead, 3.50c.; pewter, 24c.; tinfoil, 32c.

British Inquiries for Steel Products

Inquiries have come to THE IRON AGE from iron and steel firms in England for various forms of semi-finished and finished steel products. Some of these companies have had difficulty in getting shipments from the mills on purchases made in this country and the shipping situation has aggravated their troubles. Those with which THE IRON AGE has had correspondence write that they are in the market for steel bars, plates and sheets, hoops, light rails, bolts and nuts and spikes, industrial railroads complete with sleepers, boiler tubes, steel shafting, seamless steel tubes, wire and wire nails. Names of the inquiring firms will be given on application.

The United Smelting & Aluminum Company, New Haven, Conn., manufacturer of aluminum ingots and alloys, has opened a branch sales office at 26 Stone Street, New York City.

Iron and Industrial Stocks

NEW YORK, March 8, 1916.

The stock market has continued under the influence of varying phases of the treatment of international relations at Washington, and prices have advanced or declined from day to day with changes in sentiment. A few stocks have cut loose from the general tendency, such as Crucible Steel common, which advanced sharply under reputed covering of short contracts. The general tendency of the market appears to be upward. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com....	26 1/4 - 31 1/4	Republic, com....	48 3/4 - 52 3/4
Allis-Chal., pref....	75 1/4 - 79 1/2	Republic, pref....	110 - 111 1/2
Am. Can, com....	57 1/4 - 60	Sloss, com....	53 1/4 - 55
Am. Can, pref....	110 - 111	Sloss, pref....	97 3/4
Am. Car & Fdy., com....	64 - 68 1/2	Pipe, com....	16 1/2 - 17 1/2
Am. Car & Fdy., pref....	118	U. S. Steel, com....	79 3/4 - 82 1/4
Am. Loco, com....	66 1/4 - 71 1/2	U. S. Steel, pref....	115 7/8 - 116 3/4
Am. Loco, pref....	99 3/4 - 102	Va. I. C. & Coke.....	50 - 51
Am. Steel Fdries, 49 1/4 - 51 3/4		Westg. Electric.....	60 5/8 - 64
Bald. Loco, com....	99 1/2 - 107 3/4	Am. Rad, com....	398
Bald. Loco, pref....	108 1/4 - 109 1/2	Am. Rad, pref....	133 1/2
Beth. Steel, com. 450	- 479	Am. Ship, com....	39 - 39 3/4
Beth. Steel, pref....	131 - 131 1/2	Am. Ship, pref....	84 1/4 - 85
Col. Fuel.....	29 5/8 - 43	Chic. Pneu. Tool.....	64 - 67 3/4
General Elec....	165 - 169	Cambria Steel.....	81
Gt. No. Ore, Cert....	39 1/4 - 42 1/4	Lake Sup. Corp.....	10 1/2 - 11
Int. Harv. of N. J., com....	108 1/2 - 111	Pa. Steel, pref....	98 3/4 - 98 3/4
Int. Harv. of N. J., pref....	114	Warwick.....	10 1/4 - 10 1/4
Lacka. Steel....	72 1/4 - 77 1/2	Cruc. Steel, com....	70 1/4 - 83 3/4
Nat. En. & Stm., com....	23 - 25	Cruc. Steel, pref....	111 - 115 1/2
N. Y. Air Brake, 137	- 143	Harb.-Walk. Refrac., com....	83 1/2 - 84
Pitts. Steel, pref....	93 1/4	Harb.-Walk. Refrac., pref....	102
Pressed Stl., com....	49 - 53 1/2	La Belle Iron, pref....	127 1/4 - 127 1/4
Pressed Stl., pref....	101 1/4 - 102	Am. Brit. Mfg., com....	22 - 23
Ry. Steel Spring, com....	38 3/4 - 40	Can. Car & Fdy., pref....	83 - 83 1/4
Ry. Steel Spring, pref....	98 - 99 3/4	Driggs-Seabury.....	135 - 141
		Midvale Steel....	62 1/4 - 64 3/4

Dividends

The Allis-Chalmers Mfg. Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable April 15.

The American Can Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

The Pettibone-Mulliken Company, regular quarterly, 1 1/4 per cent on the first and second preferred stocks, payable April 1.

The La Belle Iron Works, regular quarterly, 2 per cent on the preferred stock, payable March 15.

The Canadian Locomotive Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

The Cambria Iron Company, \$1 per share, payable April 2.

The Hendeel Mfg. Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

The Packard Motor Car Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable March 15.

The Youngstown Sheet & Tube Company, regular quarterly, 1 1/4 per cent on the preferred and 2 per cent on the common stock, payable April 1.

The General Fireproofing Company, regular quarterly, 1 1/4 per cent on both preferred and common stock, payable April 1.

Germany Forbids Certain Machinery Imports

A cablegram of Feb. 28 from the American ambassador at Berlin states that an ordinance, published Feb. 26, 1916, prohibits the importation into Germany of certain articles, among them being "machinery and tools, including typewriters, adding machines and sewing machines."

Reuben Miller, Sr., Pittsburgh, has purchased the outstanding bonds of the Carter Iron Company, and it is said that, after judicial confirmation of the sale has been made, will interest other capital in refinancing the concern. The company has a plant in Paden City, W. Va. Its output has been muck bar and high grade iron bars, but the plant has not been operated for a long time.

The Standard Crucible Steel Castings Company, Milwaukee, Wis., took off the first heat from its recently completed 2-ton open-hearth furnace March 2.

Pittsburgh and Nearby Districts

The W. R. Miller Company, House Building, Pittsburgh, has been incorporated and will carry on the business of contracting engineer for the erection of steel and other manufacturing plants complete. W. R. Miller is president; J. C. Miller, vice-president; A. K. Barker, secretary and treasurer; Samuel Forter, chief engineer; J. M. Miller, general superintendent. The company has secured a contract from the Timken Roller Bearing Company, Canton, Ohio, for the erection of a four-hole soaking pit furnace and two regenerative heating furnaces, to be used in connection with electric steel melting furnaces.

The Brier Hill Steel Company, Youngstown, Ohio, has placed a contract with the H. Koppers Company, Pittsburgh, for a benzol plant to be operated in connection with its 84 Koppers by-product coke ovens now being built.

The McGraw Tire & Rubber Company, East Palestine, Ohio, has voted to increase its capital stock to \$3,000,000 and will make very large additions to its plant.

The three new 90-ton open-hearth furnaces being built by the Youngstown Sheet & Tube Company at East Youngstown, Ohio, are nearly finished and are expected to be ready about March 15. The company will then have a total of 15 open-hearth furnaces.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, reports that the National Tube Company, Lorain, Ohio, has ordered a 15,000-hp. Westinghouse motor for driving a 40-in. reversing rolling mill. A similar order has been received from the Indiana Steel Company, Gary, Ind.

Reports that the H. Koppers Company, First National Bank, Building, Pittsburgh, has taken a contract to build 45 Koppers by-product coke ovens for the Camden Coke Company, Camden, N. J., are officially denied.

The Jones & Laughlin Steel Company, Pittsburgh, is installing in its plant at Woodlawn, Pa., a 20-ton Bessemer converter. This will make a total of seven converters in the plant, where the duplex process for making steel is being used.

L. A. Woodard, formerly vice-president and general manager of the William Tod Company, Youngstown, Ohio, but who resigned several months ago, has purchased and is now identified with the Canton-Hughes Pump Company, Canton, Ohio. It is probable the company will take on some new lines of product and that the plant will be materially enlarged.

The Pittsburgh office of the Pennsylvania State Bureau of Employment, in the Hartje Building, was opened last week. Applications for positions were numerous. It was stated at the office that the Pittsburgh section had asked to be supplied with 1500 laborers. The Bureau of Employment is a branch of the State Department of Labor and Industry, of which John Price Jackson is commissioner. Jacob Lightner, who is director of the bureau in the State, was present at the opening. Samuel H. Thompson is director of the Pittsburgh office.

The Pittsburgh Knife & Forge Company, North Side, Pittsburgh, has bought considerable ground adjacent to its plant and will about double its capacity to meet its rapidly growing business.

The Niles Car & Mfg. Company, Niles, Ohio, has received an order from the Detroit United Railways, Detroit, Mich., for 14 electric cars of various types and a smaller order for electric cars from the Grand Rapids, Grand Haven & Muskegon.

The Cronger Company, Johnstown, Pa., with a capital stock of \$15,000, has been incorporated by Harry R. Geer, Dennis A. Cronin and H. B. Marnhart, to manufacture lubricating devices from brass, especially Cronger's graphite feeder.

The Mack Foundry & Machine Company, Wilkinsburg, Pa., with a capital stock of \$10,000, has been incorporated by A. C. Mack, John N. Paterson and S. D. Clark, to conduct a general foundry and machine shop and manufacture steel specialties, tools, etc.

Machinery Markets and News of the Works

AGGREGATE DEMAND GOOD

Foreign Buying Based on Better Judgment

Several Railroads Are Inquiring for Machine Tools, but Their Requirements Are Far Under Normal—Shipbuilding Helps Pacific Coast

Large inquiries for machine tools are lacking, but the aggregate of demand for one or a few tools from scattered domestic purchasers is excellent, and would be greater were better deliveries possible. But few shell makers are buying now, most of them having secured complete equipment. Buying for export has fallen off heavily, and where sales are made earlier shipments are specified than was the case a few months ago. Foreign purchasers are showing improved judgment in the purchases they make.

Several railroads have inquiries out in the East, but the aggregate of their requirements is so far below normal that the trade is not greatly impressed with their inquiries. Most of them appear to be buying only what they find to be absolutely essential. In the West the Chicago, Indianapolis & Louisville has issued an excellent list.

Forging machinery is reported to be in heavy demand by Cleveland makers, while steel plant equipment for export is active. The cost of building at this time is restraining some Ohio concerns from enlarging their plants, as in the case of the Lake Erie Iron Company, which has postponed the construction of two buildings.

The Cleveland Lathe & Machinery Company, Cleveland, recently organized, will establish a plant for assembling an 18-in. engine lathe and a 10-in. sensitive drill press. The company plans eventually to equip a manufacturing building.

The Sand Mixing Machine Company and the American Foundry Equipment Company have established a manufacturing plant at 1111 Power Avenue, Cleveland.

The Detroit Shipbuilding Company contemplates enlarging its machine shop by the erection of an addition to contain about 30,000 sq. ft. It will add machine tool equipment.

In Milwaukee, the home demand for milling machines and other tools is growing so rapidly that builders are much puzzled to know how to handle their bookings. Several shops in that city are temporarily engaged in the production of engine lathes.

The Stutz Motor Car Company, Indianapolis, Ind., has begun the erection of a 4-story addition, 70 x 204 ft., to cost \$100,000.

Plant extensions throughout New England continues on a most noteworthy scale and indicate that many trades are so busy that they are cramped for room.

St. Louis experiences a betterment in deliveries since the heavier part of the war demand has been cared for. In the Central South manufacturers are hampered by difficulty in obtaining materials.

Aside from the shipbuilding industry, the metal-working trades of the Pacific Coast have not been greatly stimulated by war conditions, although concentration of the shipyards on their own work has caused a wider distribution of other business. The marine shops are figuring on many tools, and some are trying to help themselves by building machines for their own use. Second-hand tools are in strong demand.

The Canadian Hoskins, Inc., Walkerville, Ont., is in the market for various kinds of wire-working machinery.

The Ontario Power Company and the Ontario Transmission Company, Niagara Falls, Ont., will build additions to their plants to be completed within the next two years at a cost estimated at \$3,000,000.

New York

NEW YORK, March 8, 1916.

No marked change is noted in the market. Those who have a diversity of machine tools to offer report a steady and satisfactory demand from domestic manufacturers, for one or a few machines on which delivery can be made, in most cases, within four or five weeks. A milling machine made in the West is being sold for delivery next November, the price to be paid depending on conditions prevailing at that time.

Buying for export has fallen off heavily, not only because England and France have been fairly well equipped, but because of the difficulties in shipping. Sellers would prefer to dispose of their machines in this country, especially when they have to hold shipments pending the procurement of ocean freight room, meanwhile having to turn down domestic applications for the tools that are to go abroad. It is conceded that foreigners are not only buying more quietly, but more sensibly than they were a few months ago.

The railroads are so slow in buying and their lists are so small as compared with normal times that the machine-tool trade is not made enthusiastic to any notable degree. The New York Central is inquiring for a few machines, including lathes, milling machines and a large rod miller. The Norfolk Southern also is in the market for tools aggregating about \$15,000. The Philadelphia & Reading is expected to make some supplementary inquiry. None of the roads is buying any more than is absolutely essential, great as their needs must be.

The shutting down of boiler shops because of their inability to obtain prompt deliveries of steel plates, even at the high prices now prevailing, is having an adverse effect on the movement of such equipment as these shops use.

The Simplex Automobile Company, New Brunswick, N. J., has been enlarging its facilities extensively of late, and extensions to various manufacturing plants indicate a continuance of demand for equipment.

A firm of engineers in this city is endeavoring to locate shops which can make parts of rapid-fire guns, for 100,000 of which it has a tentative order.

The Raritan Copper Works, copper refiner, Perth Amboy, N. J., has placed contract for extension of its No. 2 power-house to accommodate a cross-compound two-stage condensing Nordberg Corliss air compressor of 3000 cu. ft. air per min., and to permit rearrangement of other units. N. W. Pierce is purchasing agent.

The Mehl Machine Tool & Die Company, Garwood, N. J., now located in the C & C Electric Mfg. Company building, will have its new plant at Roselle, N. J., nearby, finished in about two weeks. It will be 40 x 165 ft., one story, with a part second story for offices and drafting room. The demand for its dies, jigs, etc., has been so strong that eleven months ago it rented the tool and manufacturing department of the Ellis Adding Typewriter Company.

The G. B. H. Metal Mfg. Company has been adopted as the new incorporate style of the F. & H. Metal Mfg. Company.

Syracuse, N. Y., manufacturer of gold-plated picture frames, etc., which has increased its capital stock from \$50,000 to \$100,000 to provide additional funds for expanding its business. Plans call for more than double the present output. F. L. Geever has been elected an additional director.

The Splitdorf Electrical Company, 98 Warren Street, Newark, N. J., manufacturer of ignition apparatus, has awarded contract to the American Concrete Company, Newark, for the construction of a five-story reinforced-concrete factory building. Monks & Johnson, 78 Devonshire Street, Boston, Mass., are the architects.

The Gage Machine Works, Waterford, N. Y., advises that orders being placed for its turret lathes and brush-making machinery will necessitate the erection of another building.

It is reported that the National Chain Company, 517 West Forty-fifth Street, New York, has purchased the former U. S. Metal Products Company plant at College Point, Long Island, for something like \$125,000, including all the remaining fittings.

The Turner Construction Company, 11 Broadway, New York, has been awarded contract by the Otto Higel Company for the erection of a three-story and basement factory, of brick and reinforced concrete, 54 x 235 ft., to be erected at Neried Street and Bronx Boulevard, New York City. Timmis & Chapman, 315 Fifth Avenue, New York, are the architects and engineers.

The Rotary File & Machine Company, 176 North Fourth Street, Brooklyn, N. Y., which suffered a slight damage by fire recently, anticipates making a considerable change in its plant in the near future. William A. C. Smith is in charge.

The Eastern Tool & Mfg. Company, 74 Richmond Street, Newark, N. J., has let contract for the construction of its proposed plant addition, which will be one story, 60 x 200 ft., with part basement. It will install more machinery, especially milling machines, lathes and grinding machines. C. E. Anderson is assistant manager.

The Suffern Engineering Corporation, Singer Building, New York, is remodeling all the buildings of the former Iron Clad Mfg. Company at 929 Flushing Avenue, Brooklyn, N. Y., to be sub-let to various tenants.

The Charles Fischer Spring Company has removed its main office from 88 Walker Street, New York, to 473 Kent Avenue, Brooklyn, N. Y.

The Isco Chemical Company, recently incorporated with a capital stock of \$300,000, will erect a plant at Union Street and Royal Avenue, Niagara Falls, N. Y., at a cost of about \$300,000. Construction work will start at once and it is planned to put the plant in operation about July 1, employing at first about sixty men with an ultimate force of 200. Eben C. Speiden is vice-president.

F. W. Wurster & Co., 375 Kent Avenue, Brooklyn N. Y., manufacturers of rolling mills and axles, has purchased the building nearby on South Sixth Street, formerly occupied by the King Paint Works. The company does not contemplate building or acquiring other additional property, as has been reported.

The Glens Falls Forging & Welding Company, Glens Falls, N. Y., has filed incorporation papers showing a capital stock of \$75,000. It will operate a general foundry and manufacture motor vehicle parts, special hardware, etc. J. A. Curley, Glens Falls; C. Hibbard and J. H. Conley, Fort Edward, are the incorporators.

Plans have been drawn for an addition to the plant of the Titanium Alloys Company, Niagara Falls, N. Y., to cost \$200,000 and have been approved by the president, W. F. Meredith, New York City. The building, which will be of concrete and steel, will cover about one-half an acre. The company is said to have orders to keep it busy for two years.

The Sullivan Motor Truck Corporation, Rochester, has been incorporated to manufacture automobiles, motors, engines, etc., with a capital stock of \$40,000, by D. E. Sullivan, J. G. Comerford and A. M. Sullivan.

The plant of the Weborg Spring Bed Company, Willard Street, Jamestown, N. Y., was partially destroyed by fire Feb. 29, with a loss of \$10,000.

The Buffalo Potash & Cement Company will erect a one-story factory of steel construction on the Buffalo River at Katherine Street and Erie Railroad, to cost about \$25,000.

A factory is to be built on James Street, Eastwood, N. Y., by the Western Drill Company.

Contract has been awarded for the construction of a plant addition for the Bossert Company, Hickory Street, Utica, N. Y., manufacturer of electrical supplies and auto-trucks, at a cost of \$27,000.

Philadelphia

PHILADELPHIA, Pa., March 6, 1916.

Machine-tool manufacturers in this city are now operating at from 60 per cent to 400 per cent over their former normal capacity. In most cases this additional output has been made possible by rearranging the existing equipment and by turning storehouses and storerooms, which are of course no longer of much use, into machine shops and space available for various manufacturing operations. They are all working day and night, and have orders on requiring anywhere from six months to over a year's operation at capacity.

The foreign demand here has recently shown a radical change from round-lot business to single-tool or several-tool orders. In the case of one manufacturer of cold saws, however, it was reported that all the current business in round lots that it wanted could be had; but that its present business, due especially to a strengthening of the domestic demand from all classes of customers, was so great that it could not give its attention to such export trade. Even the manufacturers of tools which are in strong demand for munition work note the strengthening of the domestic business, and are undoubtedly giving it considerable attention. The trade considers it fortunate that domestic demand is increasing only gradually, in that it can be better taken care of by a gradual readjustment of manufacturing.

The Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, has handled several times its normal business in the past year. It has doubled its capacity by adding equipment and rearranging its shops, and its present operations will be necessary for at least a year more.

The Southwark Foundry & Machine Company, Fourth Street and Washington Avenue, Philadelphia, which is now operating at about 350 per cent of its normal capacity, has already installed about \$250,000 worth of machinery and has about as much more already contracted for to bring its plant up to its proposed capacity. It is now very busy, especially in the manufacture of hydraulic presses, turbines and cold saws.

The Espen-Lucas Machine Works, Front and Girard streets, Philadelphia, is now operating at over 60 per cent its normal capacity, running day and night. It is unable to touch a great deal of possible business, and is already tied up with orders which will carry it over six months ahead at capacity. Four carloads of much needed equipment are delayed by freight congestion and are causing the company some inconvenience.

Waynesboro, Pa., is enjoying the greatest industrial boom in its history. The plant of the Frick Company now has 1000 men on its payroll and is working night shifts; the Landis Tool and the Landis Machine companies are both very busy and would hire more men. The Emerson-Brantingham Mfg. Company's plant is also being operated full time, and the Victor Tool Company has many large orders.

The Earle Gear & Machine Company, Stenton and Wyoming avenues, Philadelphia, has awarded contract to E. E. Hollenback, Fifteenth and Race streets, for the construction of a two-story brick machine shop, 50 x 120 ft., to cost about \$20,000. H. W. Sellers, Stephen Girard Building, Philadelphia, is the architect.

The Jenkins-Kirby Packing Company, Wilkes-Barre, Pa., has had plans drawn by McCormick & French, Second National Bank Building, Wilkes-Barre, for the construction of a main factory, four stories, 56 x 114 ft. a one-story garage, 27 x 66 ft. and a one-story powerhouse 25 x 52 ft.

The Belmont Iron Works, Twenty-second Street and Washington Avenue, Philadelphia, has received permits for the construction of a crane railway for the Philadelphia Steel & Forge Company, Milnor and Bleigh streets, Philadelphia, to cost about \$500.

The Benjamin Iron & Steel Company, South Pine and Buttonwood streets, Hazleton, Pa., manufacturer of steam shovels, stripping and mine cars, has acquired the property of the former Hazleton Sheet Steel mill, comprising about twelve acres, and has started the erection of a foundry, 85 x 200 ft., of brick and steel construction. It will install a cupola of about 100 tons capacity and is considering adding also a converter and electric furnace. It will establish its erecting shops on the same site. Max A. Greenburg is mechanical engineer.

The Niagara Oxygen Company, Larkin and Carroll streets, Buffalo, N. Y., is considering the location of its plant in Philadelphia, but nothing definite has been arranged. C. F. Smyth is general manager.

The John Wood Mfg. Company, Conshohocken, Pa., manufacturer of welded products, advises that its recent increase

in capital stock is to capitalize accumulated surplus and does not represent any important extension at this time.

The E. H. Myers Mfg. Company, Myerstown, Pa., will be incorporated in the near future to take over the machine shop and gasoline-engine-making plant of F. H. Myers & Bro. The new company will do automobile and general machine shop work and manufacture the engines as before. Data from companies making anything applying to their lines will be appreciated. Charles C. Loose is treasurer.

The Martin Cement Drain Tile Works, organized by J. Roy and Chester Martin, has purchased five acres on the Pennsylvania Railroad at Yardville, Trenton, N. J., and will erect a concrete factory, 40 x 100 ft., to manufacture drain tile, sewer pipes, etc. It will have a capacity of about 4000 tile per day.

New England

BOSTON, MASS., March 6, 1916.

The freight embargo by the New York Central lines against the Boston & Albany has been raised; but on the lines of the New Haven complaints of shortage of coal and raw materials increase. The situation has not become acute; but in several cities is approaching it. The American Brass Company is getting around the congestion by having copper shipped to New Haven by lighters and then bringing it to its plants in Waterbury and elsewhere in the Naugatuck Valley by trolley freight. Many New England commercial organizations are to be represented at the inquiry, to be held in Washington, March 6 and 7, into the causes of freight congestion on the Eastern roads.

Labor troubles continue, but only in a sporadic form. The Hartford, Conn., local of the machinists' union has called off the strikes in the Hartford machine shops, but has announced that the effort to gain shorter hours and more pay will be resumed when the proposed spring drive in 23 New England cities is inaugurated. It has been announced from the Boston headquarters that the shopmen of the New York, New Haven & Hartford Railroad have unquestionably voted to strike, if necessary, to gain their demand for an increase of four cents an hour, although all the shop returns were not in at the time that the announcement was made. Some of the laborers at the South Side plant of the H. B. Smith Company, Westfield, Mass., have gone out on strike in sympathy with the strikers at the other plant of the company. There has also been a strike of laborers at the General Ordnance Company, Derby, Conn. Reports indicate an early settlement. The machinists at the Fisk Rubber Company, Chicopee Falls, Mass., have demanded a reduction of working hours from 50 to 48 hr. a week, recognition of the union, time and a half for overtime and double time for Sundays and holidays. They have given the company until April 1 to reply.

The Underwood Typewriter Company, Hartford, Conn., has awarded a contract for the erection of an extension to the factory on Woodbine Street, 266 ft. long, six stories, with three wings, 50 x 183 ft., seven stories; 100 x 183 ft., two stories; 50 x 183 ft., six stories.

The Automobile Parts Company, Hartford, Conn., will not be able to occupy its new plant in New Britain until about next July, owing to delay in delivery of machinery. Due to the rapid increase in its business, the plant in Hartford will be retained. Drives for pleasure cars will be made at the Hartford plant and clutches for trucks will be made at the New Britain plant. At the annual meeting, March 10, the stockholders will vote on a proposed increase in capital from \$300,000 to \$600,000.

The Standard Nut & Bolt Company, Valley Falls, R. I., is planning an addition, 70 x 80 ft., two stories.

The Colt's Patent Firearms Mfg. Company, Hartford, Conn., has secured a permit to erect a building, 60 x 224 ft., four stories.

The Mattatuck Mfg. Company, Waterbury, Conn., has secured a permit for the erection of a three-story addition.

The Excelsior Needle Company, Torrington, Conn., has had plans drawn for a one-story addition, 62 x 72 ft. It will be occupied by the ball bearing department.

The Yale & Towne Mfg. Company, Stamford, Conn., has announced a profit-sharing plan in which all the employees of the company except those on salary will participate, being about 5500 hands.

The Brass City Machine & Tool Works, Waterbury, Conn., has been organized by George Fritz, president, and A. H. Mitchell, secretary and treasurer. It will make machinery, tools, jigs and fixtures. Both Mr. Fritz and Mr. Mitchell were formerly foremen for the Blake & Johnson Company.

The Mansfield Foundry Company, New York City, has purchased a site for a plant on Bishop Avenue, Bridgeport,

Conn. G. W. Mansfield is president and F. C. Hawkes, treasurer.

The Rowe Calk Company, Southington, Conn., has had plans drawn for an addition, 50 x 60 ft.

The Eastern Brass & Ingot Company, Waterbury, Conn., is building a factory, 38 x 200 ft., and an office building, 30 x 50 ft.

The D. E. Whiton Machine Company, New London, Conn., has petitioned the city for permission to close a part of Oak Street. If the permit is secured, a building, 150 x 200 ft., will be erected.

Beaupre Brothers, Franklin, N. H., are planning to enlarge their foundry on Webster Street.

The Norfolk Mfg. Company, Norfolk, Conn., has been incorporated by H. H. Denney, president; P. H. Quinlan, vice-president; and George E. Quinn, and will erect a two-story factory, 50 x 100 ft., to be ready next fall. The three incorporators were formerly foremen for the Colt's Patent Firearms Company, Hartford, Conn. It will manufacture a double-bar steel clamp, hand screws and vises.

The Morgan Spring Company, Worcester, Mass., through Paul B. Morgan, has purchased the plant and business of the National Mfg. Company, Worcester, which has been operated by receivers for some months.

The Reed-Prentice Company, Worcester, Mass., is adding another story, 56 x 90 ft., to one of its buildings.

The W. A. Snow Iron Works, Chelsea, Mass., is building an addition, 50 x 82 ft., two stories, to its plant at 187 Third Street.

The Blandin Company, Lawrence, Mass., manufacturer of belting, machinery and tools, has been incorporated with a capital stock of \$10,000. Ira D. Blandin is president, and John A. Abercrombie, treasurer.

The Boston Longford Auto Parts Company, Boston, Mass., has been incorporated with a capital stock of \$100,000. W. T. Hannigan is president and John J. Shay treasurer.

The M. H. Hart Company, Newtown, Conn., has been incorporated with a capital stock of \$10,000, to manufacture hardware, by M. H. Hart, W. T. Cole, Julius Hartwig and C. S. Cole.

The Stafford Company, Hyde Park Avenue, Boston, Mass., has had plans drawn for a foundry.

The Leary Muffler Company, Boston, Mass., automobile accessories, has been incorporated with capital stock of \$100,000, by D. Earle Osgood and William W. Peck.

The International Supply Company, Boston, Mass., machinists' supplies, has been incorporated by John L. D. Everett, Ernest A. James and Ernest F. Norton, with a capital stock of \$98,000.

The Diamond Link Fence Company, Boston, Mass., has been incorporated with capital stock of \$10,000 by Alfred L. West, Mary C. Booth and William G. Burns.

The Colonial Tool & Machine Company, Brockton, Mass., has been incorporated with capital stock of \$50,000 by Alonso R. Marsh, Stewart B. MacLeod and Marguerite Byrne.

The Framingham Machine Works, Boston, Mass., has been incorporated with capital stock of \$30,000 by John J. Coakley, Herbert P. Mason, and J. Sidney Stone.

The Tel-Dox Company, Boston, Mass., has been incorporated with capital stock of \$100,000 to manufacture mechanical specialties, by Rufus L. Wilbor, Gilbert Hodges, Jr., and William G. Renwick.

The Ashton Valve Company, Boston, Mass., has been incorporated with capital stock of \$150,000 by Albert C. Ashton, Ellery Peabody, Adrian D. Perry, Harry H. Ashton and George P. Pote.

The Fitchburg Machine Works, Fitchburg, Mass., has laid off its night shift of about 150 men owing to difficulties in shipping the product, due to the freight embargo and the advance in ocean insurance rates.

The Farnsworth Mfg. Company, Boston, Mass., has been incorporated with capital stock of \$150,000 by Frederick C. Farnsworth, Kenneth L. Lindsay and H. W. Evans. It will manufacture appliances for steam and water.

The M & S Gear Company, Portland, Me., has been incorporated with capital of \$2,000,000 to manufacture differential gears and auto parts.

The Cowan Truck Company, Holyoke, Mass., has had plans drawn for an addition, 100 x 200 ft., one story.

The Commercial Machine Company, Franklin, N. H., has awarded a contract for an addition, 36 x 60 ft., one story. It was recently incorporated at Boston, Mass., for \$200,000, and will engage in the building of machine tools and will continue to manufacture the line of knitting machinery formerly made by the A. N. Ames Knitting Machinery Com-

pany. The officers are: A. N. Ames, president; George L. Hancock, vice-president; Herrick Aiken, treasurer; Herbert N. Davison, secretary and general manager. The company is in the market for 18-in. lathes, a boring mill and a cylindrical grinding machine.

Baltimore

BALTIMORE, Md., March 6, 1916.

The Baltimore Rubber Tire Mfg. Company, Baltimore, has been incorporated with \$200,000 capital stock. George W. Habbersett, 427 South Broadway, is president, and Albert S. Mauk, 229-A Equitable Building, is general manager.

An addition to its present plant is planned by the Ox Fibre Brush Company, Frederick, Md.

The Philadelphia Flying Machine Company, Wilmington, Del., has been incorporated at Dover, Del., with \$250,000 capital stock, for the manufacture of flying machines.

The Service Machine Company, Chicago Ill. has increased its capital stock at Dover, Del., from \$25,000 to \$500,000.

Many improvements are being made at the New Castle Construction Company, New Castle, Del., including a new building.

New machinery for the manufacture of munitions is being installed at the plant of the Thurlow Steel Casting Company, Fourth and Booth streets, Chester, Pa.

Sawmill machinery will be installed by the Macklock Lumber Company, Buchanan, Va. M. H. McGann is manager.

Prices on portable electric tools and lathes are being sought by J. W. Hoopes, Denbigh, Va.

A. J. Williams, Big Stone Gap, Va., is seeking prices on machinery for the manufacture of shingles.

Chicago

CHICAGO, ILL., March 7, 1916.

Inquiry for both new and second-hand equipment for installation in connection with plant extensions continues to present a large market for machine tools. In the past month sales out of local stock have been occasioned in larger proportion by demands of this character than had been true for some time previous. The past week also brings out the first Western railroad list of any importance, although a number of roads are known to be preparing inquiries.

The Chicago, Indianapolis & Louisville Railway has issued the following machine tools, motor driven where drive is not specified:

- One 72-in. universal radial drilling machine.
- One No. 3 double-axle lathe.
- One 42-in. x 12-ft. engine lathe.
- One 24-in. x 8-ft. engine lathe.
- One 20-in. belt-driven toolroom lathe.
- One horizontal 30-in. gap punch.
- One hand-power punch.
- One 4-in. forging machine.
- One high-speed bulldozer.
- One 96-in., 600-ton driving wheel press.
- One double-end 18-in. throat shear.
- One 32-in. wood planing machine, belt driven.
- One three-spindle wood boring machine, belt driven.

The Grand Trunk Railway, George W. Gay, purchasing agent, is asking for quotations on the following tools: One 51-in. boring and turning mill for Canada and one Warner & Swasey hollow-hexagon turret lathe and one 36-in. Bullard vertical turret lathe for the United States.

The Tri-City Railway Company, Rock Island, Ill., is about to erect car shops in that city and will install a sufficient number of tools for the repair of its rolling stock.

The Rockford Drilling Machine Company, Rockford, Ill., has been taken over by a new organization with Leven Faust, president of the Mechanics Machine Company, at its head. The manufacture of vertical and horizontal drilling machines will be continued as at present.

The Commercial Furniture Company, Chicago, will erect a three-story factory, 75 x 175 ft., and a boiler house, 40 & 50 ft., at 2711 West Chicago Avenue, to cost \$38,000.

The Victor Mfg. & Gasket Company, 1956 South Troy Street, Chicago, will erect a three-story brick factory, 50 x 125 ft., at a cost of \$33,000.

The Illinois Steel Company, 208 South LaSalle Street, Chicago, is buying some machine-tool equipment for its South Chicago works, including lathes and drills.

The Chicago, Milwaukee & St. Paul Railroad, Railway Exchange Building, Chicago, has contracted for electric power to be used exclusively in driving its Dubuque, Iowa, shops.

The Kankakee Tile & Brick Company, Kankakee, Ill., will build a new plant, to cost approximately \$85,000.

The Sangamo Electric Company, Springfield, Ill., will erect a new factory, work to be started at once.

Improvements estimated to cost \$60,000 are planned for the Sioux City, Iowa, shops of the Chicago, St. Paul, Minneapolis & Omaha Railway.

About April 1 the Mid-Continent Mfg. Company, Wichita, Kan., will start the construction of a factory of two or three stories and undetermined size, to be used for the manufacture of tires.

The Coleman Lamp Company, Wichita, Kan., manufacturer of lamps and lighting systems, plans to erect an addition to its factory, 50 x 140 ft., two stories, and an additional building, 25 x 40 ft., two stories and basement, of which a portion will be added to its machine shop. These additions will double its floor space, but not its capacity.

Cleveland

CLEVELAND, OHIO, March 6, 1916.

The demand for small lots of machine tools is quite active, coming from well scattered sources. No new large inquiries are pending. Manufacturers engaged in munition work are apparently well supplied, as very little machinery is being placed for shell work. The call for forging machinery is heavy and is well distributed among plants using that class of equipment. The foreign demand is dull. Builders of steel plant equipment are booking many orders and have more in prospect. Among orders placed during the week was one for steel plant equipment to go to India. Other business is in prospect from Russia. Considerable blast furnace work is being placed, calling for power, handling and other equipment. The high cost of building is interfering with plant extensions, some industrial companies having postponed placing contracts after receiving bids.

The Cleveland Lathe & Machinery Company, recently organized, with temporary offices in the Rockefeller Building, Cleveland, is placing on the market an 18-in. engine lathe and a 10-in. sensitive drill press. It will establish an assembling plant and plans eventually to equip a manufacturing building. The officers are J. H. McCall, president; A. Moler, vice-president; J. A. Brady, secretary, and R. A. Tuttle, treasurer.

The Lake Erie Iron Company, Cleveland, has plans by the J. W. Frazier Company, engineer, Cleveland, for an extension to its bolt and nut works which call for a two-story steel building 50 x 145 ft. and a one-story building 42½ x 149 ft. The company advises that it will postpone placing contracts because of high prices in material.

The Ajax Mfg. Company, Cleveland, will shortly begin the erection of a one-story steel building, 130 x 140 ft., to be used as an erecting floor and machine shop.

The Patterson-Leitch Company, Cleveland, has added pressed steel elevator gates to its line of products.

A plant for the manufacture of sand cutting machines and sand blast equipment has been established at 11 Bower Avenue, Cleveland, by the Sand Mixing Machinery Company and the American Foundry Equipment Company. Heretofore these companies have had their products made in other plants. H. L. Wadsworth is factory manager.

The Samuel Austin & Son Company, Cleveland, has the contract for the erection of a building, 80 x 500 ft., for Hubbard & Co., Pittsburgh, Pa., manufacturers of shovels, etc.

The plant of the Canton-Hughes Pump Company, Wooster, Ohio, which has been in the hands of receivers, has been sold to L. A. Woodard, vice-president of the William Tod Company, Youngstown, Ohio, for about \$100,000. The manufacture of pumps will be continued and other lines will be added. The plant will probably be enlarged.

The Osgood Company, Marion, Ohio, maker of steam shovels and dredges, has purchased the plant of the Ohio Tractor Company in that city. The larger equipment will be moved to the company's main plant and the foundry will be operated at its present location. The Ohio Tractor Company will erect a new plant on a site recently purchased.

The Simpson Foundry Company, Newark, Ohio, has been sold to J. S. Herzog, and others, and will hereafter be under Mr. Herzog's management.

The W. S. Hoover Company, New Berlin, Ohio, is installing equipment for an aluminum foundry, to be located in a new addition, 40 x 80 ft.

The Timken Roller Bearing Company, Canton, Ohio, has placed its new seamless tube steel plant in operation, which is now running at full capacity on a 24-hr. schedule.

The Crescent Metal & Mfg. Company, Fremont, Ohio, has had plans prepared for a new plant. Work is expected to start in the spring.

The Metallic Grave Vault Company, Orrville, Ohio, has fitted up a plant to be placed in operation shortly. J. W. Clark is manager.

The Foster Bolt & Nut Company, Cleveland, Ohio, has placed contract with the George B. McMillan Company, Cleveland, for the erection of a building, 27 x 126 ft., which will give additional floor space for its manufacturing department. N. T. Jones is secretary.

Milwaukee

MILWAUKEE, Wis., March 6, 1916.

The demand for lathes, wanted principally for munition manufacture, is being steadily maintained and it has been discovered that numerous shops in the Milwaukee district, previously producing machinery of an entirely different character, have been working on lathes for several months. The home demand for milling machines and other tools is growing so rapidly that tool builders are again in despair as to the proper handling of bookings. Here and there purchases for export are made; but the foreign demand seems to have decreased materially in the face of an ever-increasing domestic demand. Metal-working shops are discarding old machinery as rapidly as new tools can be delivered, and the used machines are bringing such good prices that the scheme is profitable in more ways than one. News of plant extensions continue to be received from all parts of Wisconsin.

The generally more prosperous conditions are reflected in the February report of the building inspector, showing a gain of more than 100 per cent over the corresponding month of 1915. The gain is said to be a healthy one and not due to individual enterprises of magnitude. Labor trouble has cropped out in several directions, but thus far has not affected the metal-working trades, which have been apprehensive for many months. Voluntary wage increases by employers have done much to obviate strike difficulties, it is stated.

The Laursen Automatic Pump Company, Eau Claire, Wis., which purchased the Globe Iron Works at Menomonie, Wis., is making plans to build a foundry, so that all parts of its product may be manufactured under one roof. It is now moving from Eau Claire to Menomonie. The E. L. Essley Machine Company, Chicago, has purchased a lot of the used machines at a price said to be \$18,000. Delivery of the new tools required is said to be assured. The Laursen Company has declined to manufacture shrapnel and other munitions, because it desires to safeguard the development of its pumping engine business. The following officers have moved their residence to Menomonie: L. A. Laursen, president; W. J. Myers, Chicago, vice-president and general manager; W. J. Eberwein, secretary, and A. O. Johnson, works manager.

The Janesville Tractor & Engine Company, Janesville, Wis., organized recently to manufacture tractors and gasoline engines, has enlisted sufficient local capital to immediately construct and equip a plant.

The Eau Claire Mfg. Company, Eau Claire, Wis., has been organized with a capital of \$75,000 to manufacture a motor plow and general utility tractor. R. B. Gillette and G. R. Wood are associated with M. S. Opsata, the designer. It is planned to start active production by April 15.

A 50-ton artificial ice plant, 100 x 100 ft., will be erected at Waukesha, Wis., by Charles Baxter, owner of the Waukesha Spring Water Ice Company.

The Liebl & Tetzlaff Mfg. Company Luxemburg, Wis., will erect a 30 x 60 ft. addition to its machine shop.

The Reiss Steamship Company, Sheboygan, Wis., has filed articles of incorporation under the laws of Minnesota. The capital stock is \$1,000,000. The Reiss interests, which own large coal dock properties on the Great Lakes, recently purchased the Peavey Steamship Company, Minneapolis, Minn., operating four large freighters. The entire Reiss steamship business will be operated under the new corporation.

The Fisk Rubber Company, Chicopee Falls, Mass., will build a branch house, 50 x 100 ft., two stories at Sixth and State streets, LaCrosse, Wis., from plans by W. E. Bennett.

The Central Wisconsin Public Service Company, capital stock \$25,000, has been incorporated at Reeseville, Wis., by J. O. Meyers G. C. Schmitt and A. R. Meyers, to conduct an electric light and power business.

A machine shop has been established at 6703 Greenfield Avenue, West Allis, Milwaukee, under the style of Pioneer Mfg. Company. The members of the company are H. E. Wellbourne, O. E. Birkebak, D. L. Christiansen and L. K. Anderson. Besides doing general machine shop work, it will manufacture self-starting units for motor cars and

cycles. Practically all the equipment required has been purchased.

The Ewald Works, Oakfield, Wis., organized recently as a corporation with a capital stock of \$20,000 to succeed the iron works business of Arno A. Ewald, is planning to enlarge its buildings to accommodate a garage and machine shop. A small list of new equipment will be purchased.

The John Dornfeld Company, Watertown, Wis., machine shop, boiler and structural iron works, has closed a contract with the Brillion Implement Mfg. Company, Brillion, Wis., for the joint manufacture of a general utility tractor for agricultural purposes. The Brillion Company will provide the power units, the Dornfeld Company building the chassis complete. The Dornfeld shops are taking on 50 additional machinists. John Dornfeld is general manager.

The Warner Auto Trailer Company, Beloit, Wis., has leased the former plant of the J. Thompson's Sons Mfg. Company at Beloit, and plans to start a large production as soon as the buildings are fitted with new machinery. Only a small list of equipment will be required.

Stanley F. Kadow, architect, 988 Kinnickinnic Avenue, Milwaukee, has postponed taking bids on a proposed new foundry on Clinton Street, owner's name withheld, until fall.

Carpenter & Freyer, Waukesha, Wis., are preparing to build a garage and machine shop on Main Street 50 x 150 ft., and a space 35 x 50 ft., will be allotted to the machine shop.

The Oostburg Light, Heat & Power Company, Oostburg, Wis., has been organized with a capital stock of \$10,000 by H. W. Le Mahieu, John Brethouwer and L. Le Mahieu.

The Babcock Automobile Spring Company, Milwaukee, has filed articles of incorporation with a capital stock of \$15,000. The incorporators are C. Babcock, R. S. Babcock and W. J. McElroy, attorney. The plant is located at 192-194 Milwaukee Street, and specializes in the manufacture of automobile and other vehicle springs.

The A. M. Zinn warehouse at Fifth and Poplar streets, Milwaukee, will be remodeled into a private garage and machine shop for Gimbel Brothers, Milwaukee. Plans are in charge of Brust & Philipp, 506 Free Press Building. A small tool equipment will be installed for repair work. William MacLaren is general manager.

Plans for the proposed new foundry and machine shop of the Claus Automatic Gas Cock Company, 2601 Vliet Street, Milwaukee, are being prepared by Robert A. Messmer & Bro., 1004 Majestic Building. They call for a one-story brick and steel building, 90 x 150 ft. Bids will be taken about the middle of March. Practically all new equipment will be installed. Individual electric motor drive will be employed throughout and current purchased.

The Kohler Company, Kohler, Wis., manufacturing enameled plumbing ware, is preparing to build another shop addition of brick and steel, about 75 x 200 ft., one story. The work is in charge of Brust & Philipp, architects, 506 Free Press Building, Milwaukee.

The American Motors Company, Indianapolis, Ind., has purchased the service, good will and stock of repair parts of the defunct L. P. C. Motor Company, Racine, Wis., at assigned sale for \$3,400. The remainder of a stock of \$100,000 worth of standard parts and accessories was disposed of in small parcels. F. Lee Norton is assignee.

The M. I. McAvo Company, Racine, Wis., has been organized with \$25,000 capital to manufacture automobile tops, frames, etc. The incorporators are Myron I. McAvo, Alice McAvo and James Murphy.

The Crary Tool Company, Milwaukee, has been organized to manufacture chisels, pliers, wrenches and similar back tools. The capital stock is \$30,000 and the incorporators are John M. Hoerl, George Haubert, William C. Garent and George E. Garent. A workshop will be established at once on the south side of Milwaukee.

The Badger Foundry Company, 1835 Holborn Avenue, Racine, Wis., has passed into the control of Angus R. Callender, who has resigned as chief clerk of the manufacturing department of the J. I. Case Threshing Machine Company, Racine, to take the active management.

Articles of incorporation have been filed in behalf of the Factory Equipment Company, Milwaukee, to job in factory equipment and supplies, machinery, etc. The capital stock is \$15,000 and the incorporators are Frank Fifield, Ernst L. Brussat and Charles T. Brussat.

A large garage and machine shop is planned by James Morgan, Rhinelander, Wis. It will be of reinforced concrete, 60 x 140 ft., two stories.

The Pawling & Harnischfeger Company, Milwaukee, Wis., maker of cranes and hoists, is about to make additions to its pattern shop and storage vaults which will increase the capacity threefold. Two stories will be added to the present one-story building. The work is in charge of Kirchhoff & Rose, architects, 1312 Majestic Building, Milwaukee.

The Heil Company, manufacturer of welded tanks, steel structures, etc., Milwaukee, Wis., which recently increased its capital stock, did so in order to take care of its growing business.

The recent announcement that the Cluley Multiplier Company, Green Bay, Wis., has been established to manufacture calculating machines is correct, but not counting machines, as has been stated. Frank E. Murphy, Milwaukee, Wis., not A. L. Gebhardt, Milwaukee, is now vice-president, the latter having resigned.

Indianapolis

INDIANAPOLIS, IND., March 6, 1916.

The Stutz Motor Car Company, Indianapolis, Ind., has started work on a four-story addition, 70 x 204 ft., to cost about \$100,000.

The American Valve & Tank Company, Indianapolis, Ind., has increased its capital stock \$50,000, making the total capitalization \$150,000.

The Service Motor Truck Company, Wabash, Ind., has increased its capital stock from \$250,000 to \$450,000.

The National Car Coupler Company, Attica, Ind., will erect two additions to its plant, to cost approximately \$75,000.

H. D. Kramm, 917 Fletcher Trust Building, Indianapolis, Ind., has sold his interest in the Pioneer Brass Works and is incorporating a company for the manufacture of malleable aluminum castings and finished pistons. The new company's office will be for the present at 917 Fletcher Trust Building until it completes and equips its plant. The Pioneer Brass Works will continue to manufacture malleable aluminum castings under a royalty.

The Berg Clevis Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture clevises. The directors are Hjalmar C. Berg, Tilmar C. Berg and Samuel Koland, all of Starbuck, Minn.

The Marshall-Huschart Machinery Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture and deal in machinery. The directors are George W. Hurd, Omer S. Hunt and Murray Shipley.

The Indianapolis Chair Mfg. Company, Indianapolis, has increased its capital stock from \$35,000 to \$110,000.

The Grayson Tool Mfg. Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture tools. John H. Grayson, Bertram W. Simpson and W. W. Miller are the directors.

The Horton Mfg. Company, Fort Wayne, Ind., has increased its capital stock from \$150,000 to \$200,000.

The Elkhart Motor Supply Company, Elkhart, Ind., has been incorporated with \$50,000 capital stock to manufacture automobile, electrical and aeroplane parts and supplies. The directors are Milo S. Daniels, Warren W. Shelby, Walter H. Stanley, John E. Armstrong and John D. J. Farneman.

The Gary Foundry & Machine Company, Gary, Ind., has been incorporated with \$15,000 capital stock to do a general foundry business. M. T. and C. Kossakoski and C. W. Chase are the directors.

The Akron Water Company, Akron, Ind., has been incorporated with \$25,000 capital stock by Willis Leininger, William G. Miller and William Wilholt.

The Service Motor Truck Company, Wabash, Ind., has increased its capital stock from \$250,000 to \$450,000.

The Tone Engineering Company, Indianapolis, has been incorporated with \$37,500 capital stock to manufacture motors and mechanical devices. The directors are Fred I. Tone, William P. Kirk and V. I. Moncrieff.

Detroit

DETROIT, MICH., March 6, 1916.

The Detroit Sulphite Pulp & Paper Company, Detroit, will erect a one-story steel and brick factory, 85 x 214 ft., to cost \$30,000.

The Detroit Shipbuilding Company, Detroit, contemplates the enlarging of the machine shop at its Orleans Street plant by the erection of an addition containing about 30,000 sq. ft. of floor space. A boring mill and several lathes will be installed.

The Scripps-Booth Company, Detroit, manufacturer of automobiles, has been reorganized with a capitalization of \$1,000,000 and plans are being made to triple the present output. The officers are Clarence Booth, president; William E. Scripps, vice-president; F. J. Sensenbrenner, treasurer, and James S. Booth, secretary.

The Detroit Steel Products Company, Detroit, has completed plans for three additions to its plant to be commenced at once and to cost \$60,000.

The Michigan Electric Welding Company, Detroit, has increased its capital stock from \$25,000 to \$100,000.

The States Motor Car Company, Kalamazoo, Mich., has been incorporated with \$600,000 capital stock to manufacture automobiles. The incorporators include John A. Pyl, B. R. Barber and Samuel Hoekstra.

The Steel Clad Auto Bow Company, Holland, Mich., has been incorporated with \$50,000 capital stock to manufacture automobile accessories. The officers are H. R. Schnarr, Henry Winter and Richard Jellema.

The Independent Stove Company, Owosso, Mich., has tentative plans for the erection of an addition to its plant.

The Michigan Limestone & Chemical Company, Alpena, Mich., has increased its capital stock from \$2,500,000 to \$4,450,000. It is making extensive improvements to its plant at Calcite, Mich.

The municipality of Albion, Mich., will erect a pumping plant to cost about \$20,000. W. R. Moynes is clerk of the Board of Public Works.

The Novo Engine Company, Lansing, Mich., has completed plans for the erection of an addition to its foundry, 70 x 340 ft., to be equipped with two cupolas.

The Huron Implement Company, Bad Axe, Mich., manufacturer of farm tools, has increased its capital stock from \$20,000 to \$50,000. It will erect a manufacturing building, 90 x 150 ft., and a new foundry.

The Wolverine Paper Company, Otsego, Mich., has awarded the contract for a one-story addition to its plant, 100 x 112 ft.

The Brown-Wall Engineering & Pulley Company, Holland, Mich., will erect an addition to its plant to cost about \$25,000. F. A. Wall is general manager.

The Superior Foundry Company, Holland, Mich., organized with a capital of \$50,000, has let contract for the erection of its plant, which it is expected will be ready about June 1.

The Enterprise Brass Works, Muskegon Heights, Mich., has been incorporated with a capital of \$175,000.

The Detroit Valve & Fittings Company, Wyandotte, Mich., is building an addition to its annealing room, 50 x 72 ft.

The Reliance Engineering Company, Lansing Mich., recently reorganized, has purchased the Saginaw National Engineering Company, whose plant will be moved to Lansing.

The J. A. Richards Company, Albion, Mich., manufacturer of steel cut dies and jigsaws, will remove to Kalamazoo where it will build a factory, 42 x 100 ft. The capital stock will be increased from \$10,000 to \$25,000.

Cincinnati

CINCINNATI, OHIO, March 6, 1916.

The leading Corliss engine maker in this section reports quite a number of orders in hand and more in sight. The same firm also manufactures sugar machinery, and is anticipating a big demand from Cuba as soon as the dormant season there arrives.

No change is noted in the machine-tool situation. All plants are busy and doubtless could secure more orders if they were in position to make prompt deliveries. It is worthy of note that foreign contracts, as a rule, call for shorter deliveries than those made at the beginning of last year. The domestic demand is only fair. No change is noted in the local labor situation. At Hamilton the machine shops are operating with full forces. Many machinists who had gone to other cities during the recent trouble are now drifting back to their old positions.

Wood-working machinery is in good demand, in the South especially. Boiler and tank makers are more optimistic. Nearly all jobbing foundries are busy.

The Ault & Wiborg Company, Cincinnati, ink maker, has let contracts for several buildings to be erected in South Norwood, estimated to cost \$300,000, which will be used for making dyestuffs, formerly imported from Germany. It will not market the new products but will use them in the manufacture of inks. Boiler and tank equipment will be required.

The Crume Brick Company, Dayton, Ohio, capitalized at \$50,000, has had plans prepared for a factory estimated to cost \$20,000. It manufactures a patented roofing tile. W. H. Crume is president.

The Springfield Light, Heat & Power Company, Springfield, Ohio, will make a small addition to its plant.

Work has been commenced on the addition to the plant of the Miller Gas Engine Company, Springfield, Ohio.

The Wilson Resilient Auto Rim Company, Columbus, Ohio, has been formed by F. R. Wilson, and others, to manufacture a patented automobile wheel rim.

The Meteor Motor Car Company, Piqua, Ohio, will soon fit up part of its plant for the manufacture of automobile bodies.

The Wogaman Mfg. Company, Greenville, Ohio, is reported to have under consideration additions to its manufacturing facilities. It has a large sub-contract for finishing shotgun cases.

The National Rubber & Specialties Company, Winton Place, Cincinnati, has been incorporated with \$25,000 capital stock by G. W. Drach, and others, to manufacture vulcanizers and specialties. Only special equipment will be required.

It is currently reported that the American Tool Works Company, Cincinnati, will soon begin wrecking the buildings it recently acquired on Pearl Street, preparatory to beginning work on its proposed plant.

The Henderson Lithographing Company, Norwood, Ohio, is having plans prepared for an addition to its plant. It is rumored that the company also contemplates erecting a powerhouse adjoining its plant.

The Specialty Castings Company, Dayton, Ohio, has been incorporated with \$10,000 capital stock by George C. Benner, and others. It operates a foundry at 438 Homestead Avenue, but contemplates moving into a new building on East First Street. The capacity of the plant will be doubled.

The Monarch Tag Company, Dayton, Ohio, will erect a factory to cost \$20,000. Some transmission equipment will be required later.

The Sheffield Machine & Tool Company, Dayton, Ohio, has been incorporated with \$25,000 capital stock by H. O. Jones, and others. No manufacturing plans are available.

The Central South

LOUISVILLE, KY., March 6, 1916.

A lull is developing in this section for machinery, especially among manufacturers who are unable to obtain materials. Orders on hand, however, are plentiful. It is believed that many now in the market are trying other machine tool centers in the hope of getting better delivery than is possible here. Sales are good where stocks are of a size to supply the demand. Ice machinery is selling well and indications are for continued activity in electrical equipment.

Included in the contemplated improvements for the year proposed by the board of waterworks, Louisville, is an addition to the river pumping station with a pump of 30,000,000 gal. a day capacity, a new wash water pump at the Crescent Hill filter station and numerous extensions and repairs. The pumping installations are expected to cost \$535,000 and \$10,000 respectively.

The Tuell Drawer Stop Company, New Albany, Ind., has been incorporated to manufacture a patented metal drawer stop and will utilize waste metal from the National Hame Company. It proposes ultimately to equip a plant. George D. Todd is in charge.

Thomas Conners, Columbus, Ky., will erect and equip a tile and clay pottery manufacturing plant at Wickliffe, Ky., at a cost of \$5,000. He has purchased the plant of the Wickliffe Clay Products Company, and will consolidate with it his equipment at Columbus, with some additions.

W. H. S. Ritchie, West Point, Ky., has purchased a building which he is fitting out to manufacture a patented tongue-less disk harrow.

The Rex Revolving Light Company, Vine Grove, Ky., has increased its capital from \$15,000 to \$25,000 and is reported to be planning extensions. J. R. Davis and W. D. Carter are among the stockholders.

J. E. Kelley, PeeDee, N. C., has purchased the plant of the Walter Walton Electric Light Company, which he will improve and enlarge to supply 24-hr. service.

The Doudna Drilling Company, Henderson, Ky., is in the market for second-hand traction drilling outfits, gas driven preferred. E. F. Doudna is president and general manager.

The White Star Coal Company, Pineville, Ky., is in the market for a center-crank steam engine of 25 to 30 hp., second-hand, if in good order.

John I. Claybrook, R. F. D. No. 2, Maysville, Ky., is asking for prices on a boiler, engine, pump, electrical equipment, etc.

The Concrete Culvert Form Company has been incorporated at Lexington Ky., with \$25,000 capital by Willie Walker, C. J. Doty, and others, and is reported seeking contractor's equipment.

Circular sawmill machinery to manufacture 15,000 ft. of hardwood lumber daily will be installed by the Coeburn Lumber Company, Whitesburg, Ky.

E. D. Perry and S. P. Dunn have dissolved partnership

as joint owners of the Nashville Boiler & Sheet Iron Works, Nashville, Tenn. The property is now owned by Mr. Dunn and John Nolen.

J. P. Callis is erecting a new four-stand cotton gin at Germantown, Tenn., to be equipped with the latest types of machinery, including seed cleaners.

The Olive Branch Orchard Company, incorporated at Memphis, Tenn., with \$10,000 capital, will erect and operate saw mills and engage in other activities. Maurice E. Woodson, Charles M. Hill and L. D. Bejach are among the incorporators.

Townsend & Co. will equip a garage which is being erected for them at Sparta, Tenn.

The Illinois Central Railroad has let a contract to Joseph E. Nelson & Sons, Chicago, to erect a roundhouse and powerhouse at Jackson, Tenn., to cost \$100,000.

J. M. Hays & Co., Memphis, Tenn., will organize a company to build a cotton compress and warehouse to cost \$250,000. Two compresses will be provided. G. M. Shaw & Co., Memphis, are the architects.

C. A. Lyerly, Chattanooga, Tenn., is preparing plans for a cotton compress and warehouse.

St. Louis

ST. LOUIS, Mo., March 6, 1916.

The pressure for machine tools continues heavy, even though customers know before entering the market that their prospects for early receipt of machinery are very doubtful. In many lines there has been material improvement in delivery, especially since the requirements of munitions plants seem to have been measurably filled. This has enabled attention to be turned more to the needs of domestic industries, all of which without exception, are working to capacity and are planning, for the most part, larger operations. Prices continue high and are freely paid by purchasers. Second-hand machinery still commands premiums. New enterprises are forming in increasing numbers and investment capital is freer than it has been.

The Arkla Lumber & Mfg. Company, St. Louis, Mo., has increased its capital stock from \$30,000 to \$50,000 for the purpose of increasing its mill equipment.

The Fred Medart Mfg. Company, St. Louis, Mo., has increased its capital stock from \$30,000 to \$150,000 to provide for plant extension and adding to its equipment.

The Lowell Bleachery, St. Louis, Mo., and Lowell, Mass., has awarded contracts for a four-story bleachery, to cost \$48,000. The equipment contracts are yet to be let.

The St. Louis Machine Tool Company, St. Louis, Mo., has been incorporated with a capital stock of \$30,500 by C. L. Mackay, James T. Mackay, O. N. Poisse, and others, to manufacture tools of iron, steel, brass, etc.

The Johnson, Stephens & Patton Leather Company, St. Louis, Mo., has been incorporated with a preliminary capital stock of \$12,000 by A. W. Johnson, Arthur S. Patton and Howard W. Stephens to equip a plant for the manufacture of shoe factory findings.

The St. Louis Plate Glass Company, Valley Park, Mo., suburb of St. Louis, has been reorganized and will be put in operation. It suffered \$100,000 damage by floods last summer. W. J. Vance, Valley Park Trust Company, is in charge.

The St. Louis Sand Blast & Construction Company, St. Louis, Mo., has been incorporated with a capital stock of \$13,000 by Louis Schafer, E. M. Schafer and James E. Carroll.

The Franklin Auto & Supply Company, St. Louis, Mo., has been incorporated with a capital stock of \$15,000 by Sebastian Klein, George Gruenewald, and others.

The Killark Electric Company, St. Louis, Mo., has leased new quarters and will increase its capacity for the manufacture of electrical specialties. Joseph and Louis Desloge are large stockholders.

The St. Louis Frog & Switch Company, St. Louis, is erecting a manganese steel foundry at a cost of about \$30,000.

The Independent Tire Company, St. Louis, Mo., care of William Chorls, 3150 Locust Street, will equip a plant for the manufacture of tires and tubes for automobiles.

The A. B. C. Gas Filling Stations Company, Kansas City, Mo., has been incorporated with a capital stock of \$15,000 by Max Morris and Max Schwarzstein and will equip pumping and filling stations for automobile service.

The Monticello Adjustable Halter Company, Canton, Mo., has been incorporated with a capital stock of \$10,000 by O. C. Clay, F. L. Lloyd and Charles E. Brown to manufacture harness, etc.

The Farmer Auto Supply Company, St. Joseph, Mo., has

been incorporated with a capital stock of \$10,000 by S. R. Farmer, C. O. McCauley and C. V. Ayers.

The Bichler Mfg. Company, St. Joseph, Mo., has been incorporated with a capital stock of \$17,000 by Nicholas Bichler, Frederick Shamrod, and others, and will equip a machine shop.

Piles & Brown, Gorin, Mo., will add steam boiler, engine and generator equipment to their electric light and mill plant.

Memphis, Mo., has voted \$25,000 of bonds for equipment for an electric light plant. E. McDaniel is city clerk.

The N. W. Redwine Mining Company, Leslie, Ark., is in the market for boilers, engines, pumps, etc., for a plant to be installed at Harriet, Ark.

The DeQueen Ice & Light Company, DeQueen, Ark., is in the market for about \$20,000 of oil-driven engines, etc., for its plant.

The Arkansas Light & Power Company, Little Rock, Ark., will issue \$5,000,000 of bonds for new plants and improvements.

The Texarkana Water Corporation, Texarkana, Ark., will install new pumps at a cost of about \$30,000.

W. A. Pepper, 918 South Main Street, Tulsa, Okla., is reported in the market for metal stamping presses, squaring machines, metal rolls, etc.

The Walter Herring Motor Cultivator Company, Shawnee, Okla., has been incorporated with a preliminary capital stock of \$10,000 by William W. Herring and G. E. Herring, Shawnee, and Lamar McDaniel and C. M. Newson of Tecumseh, Okla., to manufacture motor cultivators.

The Travis Company, Lawton, Okla., is in the market for boilers, pumps, etc., for an oil refinery.

H. Plummer, Miami, Okla., and E. C. Pierson, Nowata, Okla., will equip an ice and refrigeration plant at Commerce, Okla., to cost about \$15,000.

The Mid-Continental Chemical Company, Sand Springs, Okla., will equip a heavy chemical manufacturing plant at a cost of about \$70,000.

The Sharpe Motor Car & Body Company, Oklahoma City, Okla., will equip a plant for the manufacture of automobile bodies and is in the market for wood and metal-working machinery.

The Carhart Motor Company, Oklahoma City, Okla., will establish a garage and machine shop to cost about \$50,000.

The Standard Motor Company, El Reno, Okla., will equip a garage and repair shop, 75 x 125 ft.

The Crutcher Motor Company, McAlester, Okla., has been incorporated with a capital stock of \$18,000 by R. L. Crutcher and John S. Stevens of McAlester, and J. C. and Dudley B. Buell of Krebs, Okla.

The Paige Motor Company, Oklahoma City, Okla., has contracted for a garage building to cost \$10,000, and will install machine shop equipment.

Bogalusa, La., W. H. Sullivan, Mayor, will expend \$110,000 on a waterworks plant, of which \$50,000 will be for an existing plant and the remainder for extension of pumping and other capacity. Two pumps of 1500 gal. per min. capacity each are wanted.

The Jennings Gas & Electric Company, Jennings, La., will install a 200-hp. steam engine.

E. B. Kennon, Kentwood, La., will install additional boiler equipment and two gasoline or oil engines, etc.

The Leesville Light & Water Works Company, Leesville, La., will install a new generating unit consisting of one 120-kw. sixty-cycle, three-phase, 2300-volt generator and direct-connected engine.

Birmingham

BIRMINGHAM, ALA., March 6, 1916.

Wholesale machinery houses have about all the business which they can handle. Delay in shipment of equipment from the factories is the principal source of complaint. The mining and lumber demand is extremely active, while gasoline engines are supplied with difficulty in the quantity desired. Hydroelectric apparatus is continuously active. General trade conditions are satisfactory and the outlook is good.

The Alabama Power Company announces that this year it will build a new hydroelectric unit at Lock 12 on the Coosa River to develop 17,500 hp., a steam plant somewhere on the Warrior River to develop 35,000 hp., to be held in readiness for possible low water on the Coosa River and will construct its northwestern Alabama loop, the total expenditure to approximate \$3,000,000. F. H. Chamberlain is general manager. The contract for the second unit has been let. The company's engineers have gone to New York

to go over and submit plans and specifications for the remainder of the work.

Robert J. Hyams, president Hyams Coal Company, New Orleans, is president; H. C. Whiteman, Whiteman Brothers, ship handlers, of New Orleans, is general manager, and H. E. McCormack, Birmingham, is vice-president of the Alabama Coal Transportation Company, recently incorporated at New Orleans to take over the coal transportation business of the Warrior River, Ala. Extensive coal-handling terminals are to be built at Mobile.

The Alabama Fuel & Iron Company, Birmingham, contemplates the issuing of bonds to cover improvements proposed at its Franklin County plants. A meeting for March 27 to consider them has been called.

The Augusta Warehouse & Compress Company will build a cotton compress at Augusta, Ga., not Macon, Ga., as has been reported. It will cost \$250,000. It has awarded contract for a 100,000-gal. tank to the R. D. Cole Mfg. Company, Newnan, Ga. Other contracts will be awarded this week.

The American Agricultural Chemical Company, New York, has purchased the plant of the Old Dominion Guano Company from Lee Ashcraft and Mel Wilkinson, Atlanta, who paid \$250,000 for it some time ago.

Frank W. East, president East Electric Blower Company, Anderson, Ind., will establish a plant for the manufacture of pipe organs at Jacksonville, Fla.

Jacksonville, Fla., will construct waterworks, including a reinforced pumphouse, requiring a centrifugal fire pump and gasoline engine, etc. The port commissioners are in charge.

The Southern Structural Steel Company, Burlington, N. C., incorporated with \$50,000 capital, will establish a steel structural works.

Texas

AUSTIN, TEX., March 5, 1916.

An increased demand for cotton gin and other machinery for industrial plants is manifested. The sale of pumps, engines and irrigation plant equipment is also an important feature of the trade in the Southwest.

The Lutcher & Moore Lumber Company, Orange, has closed contract with the Pawling & Harnischfeger Company, Milwaukee, Wis., for an electrically operated monorail system at its new mill at Orange. It will be 24,000 ft. long, including three hoists.

The Trussed Concrete Steel Company, Detroit, Mich., will open offices at Dallas.

The Texarkana Water Corporation, Texarkana, plans to make improvements to its waterworks plant and mains at a cost of about \$60,000.

The Stamford Oil Mill Company, Stamford, which has a capital stock of \$100,000, will build a cotton-seed oil mill.

The International Electric Company, Dallas, has increased its capital stock from \$160,000 to \$210,000 and will make improvements.

The W. E. Smith Mfg. Company, Cleveland, Ohio, plans to build a branch plant at San Antonio for the manufacture of waterproof roofing, paints and specialties.

The Ballinger Electric Light & Power Company, Ballinger, has been organized with a capital stock of \$50,000 by R. J. Irvine, M. F. Treadwell and W. G. Fricke.

San Francisco

SAN FRANCISCO, CAL., Feb. 29, 1916.

Aside from shipbuilding, the metal-working industries of the Pacific coast have not been greatly stimulated by war conditions. The concentration of many large plants on marine work, however, has caused a wider distribution of other business; and the return of normal activity in other industries is having a highly beneficial effect. While large orders are not numerous, marine shops are still figuring on a good many tools, and the need is so urgent that in some cases they are building their own equipment. One local plant has under construction a set of large plate bending rolls. Second hand tools are in strong demand, and it is hard to keep new tools in stock; but the movement would be much heavier if prices were normal.

Mining activity is being resumed on a large scale, and a strong demand for machinery is noted from the various copper districts of California and Arizona. The gold-producing districts also are preparing for an active season, and several large gold dredges are being built. Manufacturers of traction engines and implements are running practically at capacity, and many agricultural specialties, such as irrigation and spray pumps, small power units, etc., show a substantial increase in demand. The advance in the price of

oil has given a strong impetus to well drilling, and equipment in that line is more active than for a long time.

The inauguration of a new quick steamer service between San Francisco and South and Central American ports by W. R. Grace & Co., is expected to have important results for the export trade from this port. It is already bringing increased imports, with an increased area of distribution in this country; and the resulting development on the west coasts of South and Central America will no doubt require a great deal of American machinery.

The public service commissioners of Los Angeles will receive bids March 10 for several lathes.

Plans for the Mare Island Navy Yard improvements include a floating crane to cost about \$375,000.

Work has been started at the Hunter's Point plant of the Union Iron Works on a wooden floating drydock 450 ft. long, to accommodate vessels up to 7500 tons capacity.

The Oakland Launch & Tugboat Company, Oakland, is building a boat-building plant, including wood-working and machine shops.

The Moore & Scott Iron Works is starting work on two 7100-ton steamers, to be equipped with 2400-hp. turbine engines.

R. M. Hartwell, formerly with the Los Angeles branch of Fairbanks, Morse & Co., has started in the mill supply business in that city under the name of R. M. Hartwell & Co.

The Los Angeles branch of Fairbanks, Morse & Co., at 423-429 East Third Street, was recently damaged by fire to the extent of about \$35,000.

O. C. Perry, Oroville, Cal., representing the Pacific Gold Dredging Company, announces plans for the construction of two dredges this spring.

The Ventura Mfg. & Implement Company, Ventura, Cal., is building an addition and will double the capacity of its foundry.

The Los Angeles harbor commissioners are taking bids for hoists for the No. 1 city warehouse.

A new company headed by J. F. Vodermark of Los Angeles is preparing to build a plant near Taft, Cal., for the recovery of gasoline from oil-well gas.

The Great Western Electro Chemical Company, recently organized, is preparing to build a plant at Pittsburg, Cal., for the manufacture of chemicals by electrolysis of salt, etc.

Plans have been completed for a new shop for the Pacific Electric Railway Company at Torrance, near Los Angeles.

The Pacific Northwest

SEATTLE, Feb. 29, 1916.

Steamship companies operating Alaska boats out of Seattle will be forced to expend approximately \$250,000 in purchasing new davits, lifeboats and other appliances to meet the requirements of the seaman's act.

The Washington Ornamental Iron Works, Spokane, Wash., has been incorporated for \$15,000.

The Silver Falls Timber Company, Silverton, Ore., has announced that it will construct a sawmill plant in Silverton to cost about \$500,000. It will have an initial output of 250,000 ft. per 10-hr. day. M. C. Woodard is general manager.

The General Machinery Company, Spokane, Wash., through E. J. Simon, president and manager, has purchased the real estate, buildings, equipment and stock of the Spokane Ornamental Iron & Wire Works, and will continue to operate it. The buildings and machinery recently destroyed by fire will be immediately replaced, and new machinery added to increase the output.

The Aberdeen Shipbuilding Company, Aberdeen, Wash., has been incorporated for \$20,000 by A. C. Gailiac, George B. Bruener and S. K. Bowers. It is understood the company plans the construction of a small shipbuilding plant.

The Gallagher Machinery Company, Spokane, Wash., has been incorporated for \$10,000 by Ross E. Gallagher and C. M. Cheatham.

The Skinner & Eddy Shipbuilding Corporation, Seattle, which recently announced its intentions of constructing a large shipbuilding plant in Seattle, now states that the plant will be twice the size originally planned. The company has secured contracts for two additional vessels, and will increase the size of its plant to accommodate them.

It is announced that the Blewitt Harvester Company will construct a factory in Pendleton, Ore., to cost \$100,000. A site has been secured on West Court Street, 300 x 420 ft., with railroad connections. Construction work will begin in the early summer.

Canada

TORONTO, March 6, 1916.

The establishment of an enlarged Imperial credit in Canada is expected as the result of a conference held by Thomas White, Minister of Finance, with representatives of the Canadian Bankers' Association and chairman of the Imperial Munitions Board. It was intimated by Mr. White some weeks ago that a further credit might be provided through the co-operation of the banks with the government, and a system of dollar credits was suggested. As stated by the minister a day or two ago, an extension of the credit provided for the imperial treasury in Canada will mean further orders for war munitions. Official statements put the amount of such orders at from fifty to a hundred million dollars. In the meantime there are contracts already let which will keep the munitions industry occupied for some months more.

The Pollard Mfg. Company, Niagara Falls, Ont., machinery manufacturer, will build and equip a large addition to its plant.

The City Council, Kingston, Ont., will install a motor-driven blower at the incinerator plant.

A company in which Frank D. Law is interested is contemplating the erection of a factory at Brampton, Ont., for the manufacture of rubber, tires, etc.

Ireland & McCall's machine shop, and the garage owned by Graydon & Clegg at Trenton, Ont., were both totally destroyed by fire with a loss of \$10,000.

The Ogilvie Flour Mills Company is having plans prepared by Barnett & McQueen, Christiana Street, Port William, Ont., for a feed mill to cost \$150,000.

The A. A. Langford Company, London, Ont., will build a factory at Clarence and King streets to cost \$40,000.

J. C. Boyle, Calgary, will commence at once to build a packing plant there to cost \$1,000,000.

The Riverside Iron Works, Ltd., Calgary, is in the market for a 7½ or 10 hp. direct-current, 220-volt motor, with pulley or gear drive.

James Patrick, Hudson, Que., is in the market for a 10-hp. motor or gasoline engine.

The Sheet Metal Products Company, 228 Oak Street, Toronto, will commence at once to build an addition to its plant to cost \$11,500.

Walter A. Moisan, town clerk, Drummondville, Que., is calling for bids for the construction of a pumping station and mechanical gravity filters.

Kerry & Chance, Ltd., 550 Confederation Life Building, Toronto, is in the market for the following machinery: One alternating-current generator, 300 to 600 kw., sixty-cycle, three-phase, 6600 volts; two belted induction or synchronous motors, 300 to 400 hp., sixty-cycle, three-phase, 6600 volts; two belt-driven air compressors of 2000-cu. ft. capacity each, to give 100-lb. pressure, etc., to be delivered to Cardova Mines, Ont.

The Canadian Hoskins, Ltd., Walkerville, Ont., is in the market for machinery for the manufacture of wire goods to cost about \$10,000. R. H. Cunningham is manager.

The Canadian Iron Corporation, Three Rivers, Que., will build an addition to its plant.

The Canadian Crow-Elkhart Motor Company, Mount Brydges, Ont., will build an addition to its plant.

The Bryant Mfg. Company, Oshawa, Ont., will establish a factory there.

The Standard Marble & Tile Company, Ltd., Toronto, has been incorporated with a capital stock of \$150,000 by George R. Sroat, 55 Yonge Street; Frank C. Dunham, 145 Church Street; Franklin M. McDowell and others to manufacture marble, etc.

The Dominion Dustless Sweepers, Ltd., Peterborough, Ont., has been incorporated with a capital stock of \$200,000 by William H. Hamilton and William M. Land, Peterborough; William M. Reid, Otonabee, Ont., and others to manufacture street-cleaning machinery, etc.

The Canadian Brush Machinery Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of \$50,000 by William G. Lieburg and William M. Swan, both of Detroit, Mich.; John H. Coburn and others of Waterville, Ont.

The department of public works, Ottawa, of which R. C. Desrochers is secretary, will spend \$200,000 on improvements to the drydock at Esquimalt, B. C., and \$100,000 for improvements to the harbor at Victoria, B. C.

The Overland Tire & Rubber Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by John J. O'Reilly, Neil F. MacNeil, of Montreal; William H. Wick-

man, St. Lambert, Que., and others to manufacture rubber tires, etc.

The Wilson Scale & Machinery Corporation, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by Walter G. Barbour, secretary of C. Wilson & Son, 67 Esplanade; James T. Lauder, 19 Otter Avenue; Claud V. Weir, 193 Dowling Avenue, and others to manufacture machinery, scales, etc.

The Salts & Potash Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of \$500,000 by Thomas A. Burgess, C. O. Wood and others to manufacture explosives, potash, etc.

The Transit Company, Ltd., Toronto, has been incorporated with a capital stock of \$250,000 by William A. J. Case, Dominion Bank Building; James B. Taylor, 78 Belhaven Road; William M. Smith, 66 St. Mary Street, and others to manufacture engines, locomotives, cars, machinery, tools, etc.

The Mattagami Pulp & Paper Company, Ltd., Toronto, has been incorporated with a capital stock of \$4,000,000 by Walter J. Boland, 2 Toronto Street; John F. Boland, 1391 Bloor Street West, and others to manufacture pulp, etc.

The J. E. Edwards & Sons, Ltd., Toronto, has been incorporated with a capital stock of \$150,000 by John A. Kent, 20 Triller Avenue; George Beckett, L. A. Lillico and others to manufacture leather goods.

The Nury Sign Company, Ltd., Toronto, has been incorporated with a capital stock of \$30,000 by George G. Boulard, 131 Glendale Avenue; Arthur W. Hugman, James Curry and others to manufacture electric signs.

The Zenith Coal & Sheet Products Company, Ltd., Montreal, has been incorporated with a capital stock of \$35,000 by John W. Blair, Francis J. Laverty, Westmount, Que.; Charles A. Hale and others of Montreal, Que., to manufacture machinery, etc.

The Bay of Fundy Tide Power, Ltd., Wolfville, N. S., has been incorporated with a capital stock of \$50,000 to establish a plant to generate heat, light, power, etc., by George B. Cutten, Ralph P. Clarkson, William L. Archibald and others.

The Utility Electric Mfg. Company, Ltd., London, Ont., has been incorporated with a capital stock of \$40,000 by Robert J. Gracey and John Sussey, both of London; James A. Ross and Frank B. Durham of Wellandport, Ont., and others, to manufacture electrical stoves, equipment, etc.

The Beemer & Co., Ltd., London, Ont., has been incorporated with a capital stock of \$35,000 by John C. Beemer, Frank D. McLauchlin, Alexander A. Cockburn and others to manufacture automobiles, engines, motors, etc.

The Frost Steel & Wire Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$6,000,000 by H. L. Frost, A. L. Pope of Hamilton, Richard Harcourt and others of Welland, Ont., to manufacture fences, gates, posts, wire and steel.

The Western Canada Marble & Tile Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$250,000 by W. H. Purtell and others to manufacture marble, etc.

The Guelph Carriage Top Company, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$50,000 by Charles L. Dunbar, Leo W. Goetz, James Sutherland and others to manufacture carriage tops, machinery, etc.

The Ontario Power Company and the Ontario Transmission Company, Niagara Falls, Ont., will build extensive additions to their plants to be completed within the next two years. The total cost of them, it is estimated, will reach about \$3,000,000.

Plans have been completed for an addition to the factory of the McLagan Furniture Company, Trinity Street, Stratford, Ont., to be erected in the spring.

Government Purchases

WASHINGTON, D. C., March 6, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9360, for two 11 x 11 x 12-in. air compressors for Philadelphia; schedule 9364, for six induction motors for Boston; schedule 9382, for two horizontal centrifugal pumps and schedule 9383 for four variable-speed gears, all for Brooklyn; schedule 9384 for one electric traveling hoist for Charleston.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, till 11 a. m., March 11, for furnishing three locomotive cranes for the Mare Island Navy Yard.

NEW TRADE PUBLICATIONS

Straightening Presses.—United Engineering & Foundry Company, Pittsburgh, Pa. Bulletin R. Calls attention to a line of straightening presses operating on the principle that a beam when stressed beyond its elastic limit will bend or take a permanent set, as it is technically termed. A brief description of the way the press is operated is given and this is followed by engravings of the various types of machines with brief descriptions of them. A chart showing the force required to straighten various sections in terms of a square bar is included.

Rotator Hammer Drills.—Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, Ill. Bulletin No. 70-A. Refers to a line of rotator drills and the mountings and equipment employed with them for use in drilling rock and one of the auger type intended for drilling in formations that are too soft or too broken to be handled successfully by a standard drill. Both types of drills are described at some length, the text being supplemented not only by engravings of the different parts of the drills, but also by views of them at work. Tables of specifications are presented and mention is made of a drill sharpening machine operated by compressed air which was illustrated in THE IRON AGE, June 10, 1915.

Rolling Mill Rolls.—Pittsburgh Iron & Steel Foundries Company, Midland, Pa. Folder. Devoted to the use of Adamite rolls in break down, billet, plate, bar, roughing and blooming mills. A list of the service rendered by rolls made from this material, which is a super-carbon alloy, is included.

Hose Carts, Reels and Racks.—Wirt & Knox Mfg. Company, Sedgley Avenue, York and Twenty-third Streets, Philadelphia, Pa. Catalog No. A-16. Points out the advantages of using a line of all metal hose carts, reels and racks as compared with apparatus constructed of wood. The carts illustrated are designed for both fire department and industrial plant use and the reels range from small ones designed for supporting hose for sprinkling lawns to the large portable and stationary ones for mills, factories, warehouses, railroads, etc. Illustrations of the various styles are presented, with brief descriptions and condensed tables of specification.

Small Direct-Connected Generating Sets.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Mailing card. Mentions a generating set consisting of a vertical internal combustion engine directly connected to a generator for supplying power in small shops, mills, and other locations, or as an auxiliary to relieve the main generator of peak loads or for carrying light loads at noontime and when only a single department of the shop is working overtime. An illustration of one of these sets is presented with a reference to the bulletin in which a more extended description is given.

Cupola and Air Hoists.—Whiting Foundry Equipment Company, Harvey, Ill. Two catalogs. The first, No. 118, superseding No. 95, describes an improved type of foundry cupola which is built for either continuous or intermittent service. After a brief general description of the cupola the various special features are dwelt upon, the text being supplemented by a number of illustrations. Among the points especially mentioned are economy of fuel, rapid continuous melting and a saving in lining. A number of cupolas for special work are illustrated and briefly described and mention is made of a line of accessories. A table of sizes and capacities of various cupolas that can be furnished is included. The second catalog, No. 119, superseding No. 107, presents illustrations and brief descriptions of various types of vertical and horizontal air hoists. A general description of the hoists precedes detailed ones for the different sizes and the valve used is given special attention.

Coal Storage Systems.—Link-Belt Company, Chicago, Ill. Book No. 249. Mentions the precautions that must be observed in stocking bituminous coal and describes many varieties of stocking and reclaiming apparatus, the particular field for each type being discussed. The descriptions of the various arrangements are supplemented by engravings of the plants and the captions have been expanded to give all the salient points without making it necessary for the reader to go through the descriptive matter.

Special Wire Work.—John P. Smith & Co., 493 State Street, New Haven, Conn. Pamphlet. Relates to a line of special wire work which includes dipping baskets for plating, tinning, machine work, etc.; wire cloth, window guards, grill work, special racks and rubbish burners. In the construction of the various articles, all of which are illustrated, iron, steel, brass and copper wire are employed. There is practically no text in the pamphlet, engravings being relied upon to tell the story.

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